



**BOTANICAL GARDENS
AS A PART OF EUROPEAN CULTURAL HERITAGE**

IRIS

(KOSATEC, IRYS, VILKDALGIS, SCHWERTLILIE)

Methodology
2020

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TABLE OF CONTENTS

I. INTRODUCTION OF THE GENUS <i>IRIS</i>	7
Botanical Description	7
Origin and Extension of the Genus <i>Iris</i>	9
Taxonomy	11
History and Traditions of Growing Irises	11
Morphology, Biology and Horticultural Characteristics of Irises	11
Iris Breeding	13
Trial Gardens	15
Iris use	15
International Iris Societies, Registration and Evaluation	16
Description and Evaluation of Irises.....	17
II. IRISES IN BOTANICAL GARDENS	20
Průhonice Botanic Garden, Czech Republic.....	20
History and Traditions of Growing Irises in Czech Republic and in Průhonice ..	20
Iris Projects and Organizations in the Czech Republic	21
Introduction of the Průhonice Botanic Garden Assortment	24
Czech National Breeding	32
Maintenance of the Iris Collection in Průhonice	38
University of Wrocław Botanical Garden, Poland	41
History and Traditions of Iris Growing in the University of Wrocław Botanical Garden and Arboretum Wojsławice	41
Iris Projects and Organisations in Poland	42
Introduction of the Iris Collection of the University of Wrocław Botanical Garden.....	43
Introduction of the Iris Collection of the University of Wrocław Botanical Garden - Arboretum Wojsławice	49
Polish National Breeding of Irises.....	53
Maintenance of Irises in the University of Wrocław Botanical Gardens	57
Basic Garden Maintenance of Irises in the University of Wrocław Botanical Gardens	57

Vilnius University Botanical Garden, Lithuania	59
History and Traditions of Growing Irises in Lithuania and in Vilnius University Botanical Garden	61
Iris Projects and Organizations in the Lithuania	62
Introduction of the Vilnius University Botanical Garden Iris Assortment	65
Lithuanian National Breeding Development of Irises	68
Maintenance of the Iris Collection in Vilnius Botanical Garden	76
III. RECOMMENDED GARDEN CULTIVARS OF IRISES	80
IV. SUMMARY AND RECOMMENDATIONS FOR THE GARDEN MAINTENANCE OF IRISES	84



HOW TO USE THIS METHODOLOGY

This methodology was created within the European Union's Erasmus + international program. It is the result of cooperation between botanical gardens from varying backgrounds. These include Průhonice Botanical Garden (Institute of Botany, Czech Academy of Sciences), Wrocław University Botanical Garden, Vilnius University Botanical gardens and Gartenkulturzentrum Niedersachsen Park der Gärten, Bad Zwischenahn.

It aims to be an educative and informative guide for professionals and the general public and training material for young employees or students. It focuses on an innovative comparison of the gardens to find similarities, inspiration and a mutual understanding of the historical, cultural, social and educational, economic and horticultural characteristics and practices of botanical gardens in different European countries.

The botanical gardens in Europe have similar historical, cultural and social roots but also have the country-specific conditions of their origin, mission and development. The botanical gardens located in different countries have a different, country and locally-specific climate, soil, resources, maintenance, pests and diseases. However, they can grow the same plants after all. Working in a botanical garden has many levels and it can offer many opportunities for informal learning. Every botanical garden is a unique location for educating students, young people and the public.

This methodology is one part from a set of four booklets created within the project. It is followed by publications about other significant peony and daylily plant genera. In addition, one of the booklets is dedicated to botanical gardens as part of European cultural heritage.

The booklet is divided into 4 chapters allowing the reader to understand the issue of botanical gardens and collections of irises in terms of the scientific and historical significance. The first part is dedicated to the botanical introduction of the *Iris* genus, the history and traditions of cultivating irises. The second part of the booklet is about partner gardens and their corporations. It deals with history, science, culture, arts and education in the context of the botanical gardens. The third part offers a list of recommended varieties of irises as a conclusion of information from all partner gardens from different countries. The publication also highlights examples of good practices in the basic garden maintenance of irises, which are both important and useful for the reader. They can serve as inspiration or educational material.

The last part of the methodology offers a list of resources as well as links to websites or publications both in English and in the national languages of our partner's countries.

LIST OF ABBREVIATIONS:

TB – Tall Bearded Irises

IB – Intermediate Bearded Irises

BB – Border Bearded Irises

MTB – Miniature Tall Bearded Irises

SDB – Standard Dwarf Bearded Irises

MDB – Miniature Dwarf Bearded Irises

SA – Space Age Irises

JI – Japanese Irises

SIB – Siberian Irises

SPU – Spurias



Display of SDB irises in Průhonice Botanic Garden



I. Introduction of the Genus *Iris*

Botanical Description

The iris is a perennial plant. The rhizomes are branched, the leaves are usually sword-shaped especially in the case of small species, often glaucous. The flowers grow on a stem either individually or in a fan-shaped spike. The first-order bracts that grow at the branch are usually herbaceous, similar to the leaves. The second order bracts - spathes, are two to three, wrapping the buds and the lower ovary. They can be either herbaceous or scarious, while the features are often combined. The flowers consist of two rows of tepals, the three inner tepals (standards) and the three outer tepals (falls) in the case of the *Oncocyclus* section with a spot in the front of the beard, in the middle of the outer tepals, sometimes referred to as a tongue. One stamen bends over each of the outer tepals. It is protected from above by the extended style arms, so that the stamen is hidden between it and the outer tepal. At the end of the arm of the style is a stigma. The ovary is lower and is connected to the other parts of flowers by a flower tube formed by the base of the tepals. The pod is a triangular capsule.

The *Iris* subgenus (bearded rhizomatous irises) is characterized by the presence of a beard (a strip of multicellular or single cellular hair) on the outer tepal, at the site of the middle vein. Representatives of the following sections are often grown in garden culture e.g.: *Iris* (*Pogoniris*), *Psamniris*, *Oncocyclus* and *Regelia*.

Subgenera: *Limniris*, *Xiphium*, *Scorpiris*, *Hermodactyloides*, *Nepalensis* belong to beardless irises, characterized by the absence of a beard on the outer tepals. They often form clumps. The stem is mostly branched. In the case of a single flower, it has 3 smaller inner tepals and 3 larger outer tepals, a double flower has up to 6 tepals of almost the same size, full-flowered include 9-12 tepals. They are either rhizomatous like *Limniris* (beardless irises) with stiff slender rhizomes, sometimes with stolons, bulbous represented by only one subgenus – *Nepalensis* or bulbed with a smooth bulb covering like *Scorpiris* (*Juno*) or *Xiphium* and with a reticulate bulb covering like *Hermodactyloides* (*Iridodictyum*).

The *Limniris* subgenus (*Apogon*) beardless irises with the absence of a beard on the outer tepals includes 2 sections - *Lophiris* with a crest on the outer tepals and *Limniris* with 16 other series. The most abundant beardless irises in our climatic conditions are *Spurias* (SPU) - series of *Spuriae*, Water and Japanese irises (JI) - serie *Laevigatae*, and Siberian irises (SIB) - serie *Sibericae*.

Pardanthopsis (**Vesper iris**) is very different than the mentioned subgenera although it belongs to the *Iris* genus, represented by only one species, *Iris dichotoma*.



Subgenus	Sections	Series	Horticulture classification	Group abbreviation	Group	Members	Description
Iris	Iris		bearded perennial irises	Iris barbata group (Rhizomatous bearded irises)	TB	Tall Bearded	> 70 cm
					IB	Intermediate Bearded	41 - 70 cm
					BB	Border Bearded	41 - 70 cm
					MTB	Miniature Tall Bearded	41 - 70 cm
					SDB	Standard Dwarf Bearded	20 - 41 cm
					MDB	Miniature Dwarf Bearded	≤ 20 cm
					SA	Space Age Iris	with unusual shape of beard
Iris	Oncocyclus		bearded perennial irises		<i>I. acutiloba</i> , <i>I. atrofusca</i> , <i>I. atropurpurea</i> , <i>I. iberica</i> , <i>I. lortetii</i> , <i>I. paradoxa</i> , <i>I. petrana</i> , <i>I. sari</i> (OH) Onco Hybrid, (OB) Oncobred, (OG) Oncogelia, (AB) Arilbred-Aril irises (AR) x bearded irises		
	Regelia			<i>I. hoogiana</i> , <i>I. korolkowii</i> , <i>I. stolonifera</i> (RH) Regelia Hybrid, (RC) Regeliocycclus, (AB) Arilbred - (AR) Aril irises x bearded irises			
Limniris	Lophiris	Crossiris, Lophiris	crested irises		<i>I. japonica</i> , <i>I. formosana</i> , <i>I. milesii</i> , <i>I. wattii</i> , <i>I. tectorum</i> <i>I. cristata</i> , <i>I. lacustris</i> their cultivars and hybrids		
		Spuriae	perennial		<i>I. crocea</i> , <i>I. graminea</i> , <i>I. kerneriana</i> , <i>I. sintenesii</i> , <i>I. spuria</i> , <i>I. orientalis</i> , <i>I. pontica</i> , <i>I. xanthospuria</i> , (SPU) Spurias – cultivars of species within the section Spuriae		
		Laevigatae	perennial		<i>I. ensata</i> , <i>I. laevigata</i> , <i>I. pseudacorus</i> , <i>I. versicolor</i> (JI) Water and Japanese – cultivars of <i>I. ensata</i> , (VERSI) – cultivars of <i>I. versicolor</i> , (PSEU) – hybrids from crossings <i>I. ensata</i> x <i>I. pseudacorus</i> hybr.		
		Siberitcae	perennial		<i>I. sibirica</i> , <i>I. clarkei</i> , <i>I. chrysographes</i> , <i>I. sanguinea</i> , <i>I. forrestii</i> , <i>I. wilsonii</i> , <i>I. typhifolia</i> , <i>I. delavayi</i> SIB (SB) Siberian irises - hybrids within a group (<i>I. sibirica</i> and <i>I. sanguinea</i>) including hybrids within a group Chry (Chrysographes group)		
Scorpiris			bulb irises		<i>I. albomarginata</i> , <i>I. aucheri</i> , <i>I. bucharica</i> , <i>I. capnoides</i> , <i>I. caucasica</i> , <i>I. cycloglossa</i> , <i>I. linifolia</i> , <i>I. magnifica</i> , <i>I. orchoides</i> , <i>I. persica</i> , <i>I. pseudocaucasica</i> , <i>I. rosenbachiana</i> , <i>I. vicaria</i> , <i>I. warleyensis</i> (JU) Scorpiris – species and cultivars within subgenera Scorpiris		
Xiphium			bulb irises		<i>I. latifolia</i> , <i>I. tingitana</i> <i>I. xiphium</i> (XP) Xiphium, (XIPH, ENG) English irises, (DUT) Dutch irises		
Hermodyctyloides			bulb irises		<i>I. bakeri</i> , <i>I. histrio</i> , <i>I. histrioides</i> , <i>I. reticulata</i> , <i>I. winogradowii</i> , <i>I. danfordiae</i> (RT) Reticulate – species, cultivars and hybrids within subgenera Hermodyctyloides (RET) – cultivars of <i>I. reticulata</i>		

Taxonomy and horticulture classifications of taxa most grown in European gardens



Iris dichotoma – Vesper iris



'Jarmila' (Blažek, 2013) TB

Origin and Extension of the Genus *Iris*

Iris is the largest genus, with a particularly complicated botanical classification, in the family of the *Iridaceae*. It contains about 300 species and many hybrids and varieties. Almost all species are found in moderate zones of the northern hemisphere, from Europe to Asia and the whole of North America. The iris is quite diversified in terms of its ecology, occurring mainly in dry, semi-desert or colder, rocky, mountainous areas, but it also occurs on grassy slopes, meadows, bogs and river banks.

The genus consists of **six subgenera**. The most numerous is the ***Iris* subgenus**, the representatives occur from the Atlantic coast of southern Europe to Middle Asia. They are not typical mountain plants, although some occur at high altitudes. **Subgenera: *Limniris*, *Xiphium*, *Scorpiris*, *Hermodactyloides*, *Nepalensis*** grow only in the northern hemisphere in a subtropical and temperate climate zone.

Due to the large number of species, varieties, the variety of shapes and the wide range of colours, irises are among the most valued and the most frequently cultivated perennials in gardens.



Iris pumila - pigmy iris in national natural reserve Pálava, Czech Republic



Population of *Iris pumila* on the Říp mountain, Czech Republic



Taxonomy

Phylum (phylum): green plants (Viridophyta/Chlorobionta)

Division (divisio): flowering plants / angiosperms (Angiospermae/Magnoliophyta)

Class (classis): monocotyledons (Monocotyledones)

Order (ordo): asparagoid lilies (Asparagales)

Family (familia): (Iridaceae)

Genus: *Iris* (Iris)

History and Traditions of Growing Irises

For centuries, irises have been a part of our gardens, parks, monasteries, castles as well as old residences. They have even become a part of our history as they have accompanied mankind since at least the Middle Ages. Due to the rich variability in the shape and color of the flower, they are one of the most cultivated ornamental plants and they are also one of the most favorite garden plants. They are suitable for perennial beds or garden ponds and can even be used in rock gardens as well.

The name was given to them by the Greek physician Hippocrates in honor of the rainbow goddess Iris, who brought news from Olympus to the earth through the rainbow. Irises have been known since ancient times, for example in 1950 BC they were listed among the spoils of war brought by Pharaoh Thutmose from the Syrian wars. In around 1500 BC, irises appeared on the list of medicinal plants. Probably the oldest written mention of the cultivation and use of irises for essential oils can be found in Theophrastus's writings from around 300 BC. In the early Middle Ages, it was one of the symbols of the Virgin Mary. The yellow iris is a heraldic sign of the Franconian and later French kings. Irises were also depicted and described in Renaissance and botanical works of horticultural literature.

The first written mention of irises as ornamental garden plants was most likely in the work "Rariorum aliquot stirpium per Hispanias observatarum Historia" by Carolus Clusius from 1576. In 1753, the botanist Karel Linné unified the ancient name *Iris* in "Species Plantarum", describing 18 species divided into two groups – bearded and beardless irises

Morphology, Biology and Horticultural Characteristics of Irises

For the use of irises in horticulture, some features are more significant than others. The habit of the iris plant is the most noticeable and some produce a compact clump like *Iris sibirica* or *I. ensata* and others like *I. spuria* grow quite far from the origin rhizome and take up quite a lot of place. An interesting characteristic is the branching of the stem: *I. dichotoma* abounds in the prolific number of branches and the large number of flowers on a single stalk, but there are some species




The Sence of Smell (1617 – 1618) – Artist J. Brueghell painted different irises founded in the Spanish royal gardens of that time as seen on the picture. They are probably *Iris xgermanica* 'Florentina alba' in the left corner, then *I. xgermanica*, the old blue flag and Spanish iris, *Iris xiphium*

which have just one or two flowers on its stem like *I. pumila*. In general, iris cultivars are derived of different species and the iris variability is the richest among others in the Asparagales order.

Dormancy is a temporary suspension of visible growth that can be observed by most of the irises grown in our climatic conditions. The barbata group temporarily stops growing in the early summer and starts to grow again in August and this is called aestivation. Most of the dormant irises lose the big mass of their foliage after a frost and over winter with no leaves in the case of e.g. Siberian, Spurias or Japanese irises. The rhizomes have already formed the new buds which will continue growing in spring. Some bulbed irises resume the growth of foliage in the autumn like *Iris xhollandica*. Some taxons are without any dormancy sign in the place of their origin like *I. foetidissima*, *I. tenax* or *I. unguicularis* but in colder climatic conditions can be damaged by frost and they don't belong among those which can reliably over winter in colder countries.

Groups which are challenging to grow include Scorpiris (Juno) or Oncocyclus, or reticulate bulbs whose dormant period is in the summer and do not require rain.



The flower characteristics of irises differ but in general a single flower consist of 3 (upper) inner tepals and 3 (lower) outer teppals. In describing the flower, we focus on the colour and size of the flower segments (tepals) and their edges, hafts, veining, beard or crest, and the number of tepals in a flower (single, double or full flower). The shape and structure of the flower is always interesting. For more information about iris characteristics, read this chapter of the American Iris Society <https://www.irises.org/gardeners/care-classification/classification/>.

Iris Breeding

The oldest grown plants were wild plants selected as clones from natural localities. Irises were pollinated in gardens naturally or crossed by humans. Ancient bearded garden irises are represented mainly by *Iris ×germanica* s. l. with its clones. The historic assortment of the *Iris barbata* group was bred by German breeders Goos – Koenemann, English Bliss and French Cayeux. The oldest cultivars were bred starting in the middle of the 19th century by the French Vilmorin, who was one of the first to import large-flowered tetraploids and use them in breeding. Since then, the tetraploid cultivars of *Iris barbata elatior* (TB) have predominated all irises grown and are spread in Europe, America, Australia and in the last century they have even become interesting for Asian gardeners as well.



Visitors appreciate garden's displays of Tall Bearded Irises in Průhonice Botanic Garden

Water and Japanese irises are the oldest ornamental plants within the *Iris* genus among all irises, mostly grown and popular in Asia and have been part of the culture there for over 500 years. Cultivars of Japanese irises are derived from *Iris ensata* (Kaempfer's irises) and cultivars of Water irises are derived mainly from the species *I. versicolor*, *I. virginica*, *I. laevigata*.

Beardless irises grown in gardens also include Spurias – the name being derived from the *Iris spuria* species. They were introduced into European gardens in the 19th century thanks to the French nursery of M. Lemonnier.

The most often grown beardless irises are garden Siberian irises, mainly hybrids of *Iris sanguinea*, which originated from Asia and were introduced in European horticulture around 1900. The first tetraploid plants with wider and larger flowers were obtained with colchicine in the 1970s. The modern Sino – Siberian group is derived from Asian irises such as *I. chrysographes*, with dark violet flowers, as well as *I. forestii* with purple flowers and a golden middle vein.

The rich assortment of hundreds of thousands of *Iris* cultivars caused gardeners and botanists from all over the world to get inspired to collect the cultivars, wild plants and their hybrids in specialized gardens or botanic gardens. In Europe, the first collections of irises in the framework of botanical gardens were established in the 18th century. In 1756, the largest collection of irises in the Moscow Botani-



Iris Trial Garden in Průhonice Botanic Garden in 2018 (judges of irises from left, Z. Caspers, Z. Krupka, J. Svoboda, Z. Rubášová)



cal Garden was founded at that time with 70 species and varieties. In 1840, the French gardener Jean Nicolas Lemon published a catalog of irises "Annales de Flore et de Pomone" where he mentioned one hundred cultivars of irises. Nowadays, there are thousands of registered cultivars thanks to the many professionals and amateurs. The American Iris Society keeps records of all iris cultivars (see chapter International Iris Societies, Registration and Evaluation).

Trial Gardens

There are also iris trial gardens aiming to evaluate novelties in iris breeding from members of the Iris Societies and also from modern breeders. International trial gardens are:

- Presby Iris Memorial Gardens in New Jersey, USA
- Parc Floral de Paris (probably the oldest one since 1901), France
- Giardino dell'Iris (Florence), Italy
- Munich Botanical Garden, Germany
- Botanical Garden of the Russian Academy of Sciences in Moscow, Russia
- Trial garden of Middle European Iris Society, Průhonice Botanic Garden, Czech Republic. Detail description of this trial garden follows in chapter Iris Projects and Organizations in the Czech Republic

Iris use

The healing effects of iris were already described in Mattioli's writings in 1558–1560. This especially relates to the root after drying, but the flowers were sometimes used to relieve cramps, toothache, labor pains, gout and colds. Iris or violet root (from the rhizome of a pale iris that smells pleasantly like a violet) dried and crushed into powder helps to expectorate and facilitates breathing. It is still used today for cosmetic treatments, for the production of perfumes and as an ingredient in liqueurs. For this purpose, the most suitable is *Iris pallida* or a clone *I. ×germanica* 'Florentina Alba'.

Native Americans used blue flag - *Iris versicolor* most often as a cathartic to cleanse the body and emetic to induce vomiting. Today, blue flag is used much in the same way, prescribed to help detoxify the body.

The rhizome of *Iris japonica* can be used in the treatment of injuries. A decoction of the plant is used in the treatment of bronchitis, internal injuries, rheumatism and swellings.

Among beardless irises, we might find some taxons with long and very narrow leaves like *Iris lactea* or *I. versicolor* that are used to make baskets or some mats.

The roasted and ground seeds of *Iris pseudacorus* are used as a substitute for coffee.



Field collection of a Dalmatian iris (*Iris pallida*) grown for orris root production in Italy

International Iris Societies, Registration and Evaluation


American Iris Society

The mission of the American Iris Society (AIS) founded in 1927 is to organize and disseminate knowledge of the genus *Iris*, while fostering its preservation, enjoyment and continued development. The society is the only international society which registers iris cultivars in a database called the *Iris Checklist*, which is accessible only to AIS members. Iris lovers or amateur gardeners might search for more information about iris cultivars in its database called *Iris Encyclopedia*. (<https://wiki.irises.org/encyclopedia>)

AIS grants various medals and awards like Dykes Memorial Medal. First awarded in 1927, it is the highest award of the AIS, awarded to no more than one iris per year. Another award are Award of Merit or Honorable Mention. In this case only AIS registered judges may vote for irises of each specific classification type (15 classification types). As for various popularity awards, which are primarily voted on by AIS members at the annual AIS Convention.

Historic Iris Preservation Society

The mission of Historic Iris Preservation Society (HIPS) founded in 1988 is to promote and foster the preservation of historic iris. HIPS resources are open to the public. However, members enjoy a user community forum and semi-annual public ac-



tions. There are many rare historic irises being grown in gardens around the world that are in danger of being lost forever. Major function is assistance in rescuing and redistributing the varieties to current collectors to ensure they stay around for future generations to enjoy.

Middle European Iris Society

Founded in 1997, the society brings together breeders and iris lovers from different not only European countries (mostly from Czech and Slovak Republic, Poland, Lithuania, Ukraine, Belgium, France, Italy or USA and Great Britain) They organize annual conventions, iris trial garden, maintain contacts with foreign iris companies and AIS registration.

German Society of Perennial Friends - Iris Group

(Gesellschaft der Staudensfreunde – Fachgruppe Iris) The Society of Perennial Friends has emerged from a society of Iris lovers founded more than 50 years ago. Like its predecessor, the Iris specialist group aims to preserve, increase and disseminate knowledge about the culture and breeding of the various Iris species and their cultural forms. It organizes flower exhibitions and evaluation of novelties, it maintains contacts with foreign iris companies, provide advice on breeding issues or a seed exchange.

The most well-known garden with the largest collection of irises in the world is the **Presby Iris Memorial Gardens** in New Jersey. In 1927, the gardens were established in the name of Frank Presby, a local resident known for his stewardship of the American Iris Society. The gardens contain over 14,000 irises of approximately 3,000 varieties. By the arching slope of the garden visitors can see why Presby is often referred to as the “rainbow on the hill”.


In Europe, there are three large iris gardens: Botanical Garden of the Russian Academy of Sciences in St. Petersburg (Russia), Průhonice Botanic Garden at the Institute of Botany, CAS (Czech Republic) and the Merian Gardens in Basel (Switzerland).

In recent years, national collections of the *Iris* genus, have gained significant importance e.g. in Great Britain (The National Council for Conservation of Plants and Gardens e.g. The Royal Botanical Garden in Kew), France or Germany.

Description and Evaluation of Irises

Descriptor Lists for Irises by Průhonice Botanic Garden, Czech Republic

In the Czech Republic and Lithuania, descriptor lists are used to describe the morphological characteristics of irises. A descriptor list of genus *Iris* originated in 2008 in the Czech Republic, written by Milan Blažek, Uljana Blažková and Zuzana Caspers. It consists of 70 characteristics. Morphological descriptors: 68. It is a summary of the identifying descriptors within the taxonomic groups of the *Iris* subgenera and



the Iris section (Pogoniris) - bearded irises. It reflects the morphological characteristics of the default species and cultivars of bearded iris (*Iris barbata* hort.) used in the breeding of the varieties. From the morphological characteristics, the descriptor list describes the rhizome as well as the leaves and the stem in 13 descriptors. The flower is characterized by 48 descriptors, mainly the colour of each flower part and the orientation of tepals. Pods (capsules) are described by 2 characteristics. Biological characteristics are described by 5 and economic ones by 2 descriptors. The evaluation is focused on three descriptors on resistance to diseases and pests, which damage plants and lower their ornamental value.

The descriptor list of the *Limniris*, *Nepalensis* and *Pardanthopsis* subgenera written by Zuzana Caspers (published in 2019) consists of 98 descriptors. Morphological descriptors: 86. It is a summary of the identifying descriptors within these taxonomic groups. It reflects the morphological characteristics of the default species used in the breeding of the varieties. From the morphological characteristics, the descriptor list describes the rhizomes in 3 descriptors and the leaves and the stems in 6 descriptors. The flower is characterized by 54 descriptors, mainly the colour of each flower part and the type of flower. Pods and seeds are described by 11 characteristics, including three biological characteristics and eight economic descriptors. The evaluation is focused on three descriptors on susceptibility to diseases and pests, which damage the plants significantly and depreciate their aesthetic value.

The descriptor list has been created for the needs of the **National Programme on the Conservation and Utilization of Plants, Animals and Microbial Genetic Resources Important for Nutrition and Agriculture**.

Description Lists for Irises by Botanic Gardens of Vilnius University and Kaunas Botanic Garden, Lithuania

The iris descriptor list is used in the Botanical Garden of Vilnius University and Kaunas Botanical Garden of Vytautas Magnus University, Lithuania. The author of the descriptor list is Stasė Dapkūnienė. The descriptor list was published by the Ministry of the Environment in 2013. The Lithuanian descriptor list includes 32 characters in two groups - vegetative parts of plants and generative parts of plants. In some characteristics, the descriptor list for the *Iris* genus is similar to the Czech descriptor list, but it focuses more on ornamental value such as the length of the flowering period (in days) and the texture of the tepal surface and fragrance. It also includes features that describe a type of branching, the texture of the leaf surface, the stiffness of the foliage and the uprightness of the stalk.



'Temperament' (Blažek, 2013) SPU



II. IRISES IN BOTANICAL GARDENS

Průhonice Botanic Garden, Czech Republic

History and Traditions of Growing Irises in Czech Republic and in Průhonice

Irises have been grown since very far back in our history and they can still be seen in gardens, parks and botanic gardens in the Czech Republic. They have become a cultural heritage and deserve to be preserved for future generations. The oldest cultivated irises are the ancient cultural hybrids, which were later mostly described as botanical species and their selected clones. The iris assortment grown in the Czech Republic consists of indigenous Czech species and other wild species and their clones (very limited), ancient iris varieties (limited), historic iris varieties (widespread) and modern cultivars (widespread).

The Beginnings and Purposes of Growing Irises in Průhonice Botanical Garden

In the early 20th century in the Dendrological Society's garden, established by the count Arnošt Emaul Silva-Tarouca in Průhonice, there were about 800 species and cultivars of irises grown. Unfortunately, they were lost after the Second World War. Irises were on a list of ornamental plants grown in the Lednice-Valtice Cultural Landscape in the 19th century. In the Czech Republic three botanical gardens collected irises to a large extent in the 20th century. The oldest (since 1963) and largest collection of irises is at Průhonice Botanical Garden. The other two Iridariums are at Prague Botanical Garden in Troja and Botanical Garden and Arboretum of Mendel University in Brno that is also worth seeing for a collection of Dykes Memorial Medal winners - the highest awarded irises in their class.

The basis for the iris collection of the Botanical Garden of the Czechoslovak Academy of Sciences, founded in 1963 in Průhonice, was the private iris collection of Milan Blažek. This iris expert and iris breeder started to collect irises in a private garden in Zbuzany near Prague dated to the 1950s. During the sixties, he transferred his collection of irises to the garden in Průhonice. Later on, he became the head of Průhonice Botanical Garden. The first plants in the collection were native species of Czech flora, historic cultivars and cultivars of that time grown in the Prague district. Historic and pre-war varieties were exchanged with Milada Opatrná, who studied the horticultural value of the assortment of ornamental perennials including irises at the Research Institute of Ornamental Horticulture in Průhonice and from other large Czech nurseries of that period e.g. Böhm's nursery. The growers and breeders from the Czech Republic but also from different countries donated cultivars to the Průhonice collection. Hundreds of cultivars were donated by Helen Gräfin von Zeppelin, owner of a private collection of irises and the renowned

perennial nursery in Laufen. The first modern cultivars imported to Czechoslovakia and Průhonice Botanic Garden came from the American breeder Robert Schreiner. In 1957, Milan Blažek was probably first Czechoslovak breeder to target the crossing of irises.



Display of beardless irises - Spurias in Průhonice Botanic Garden

Iris Projects and Organizations in the Czech Republic

Since the 1950s, a lot of exhibitions of cut flowers have been organized by different institutions and societies. The first exhibition of pre-war bearded iris cultivars and historic irises grown around the Prague district was organized by Milan Blažek and took place in the National Museum in Prague in 1956.


In Průhonice Botanic Garden and Prague Botanical Garden, guided tours for the public focused on flowering irises are organized. Průhonice Botanic Garden also organizes an event especially for children from 1 to 16 years old in the drawing of flowers and it's always in the flowering period of irises. Exhibitions of the best drawings are shown in the Gallery of Průhonice Park.



Children drawing irises in TB display of Průhonice Botanic Garden



Exhibition of irises in Visitor's centre in Průhonice Park



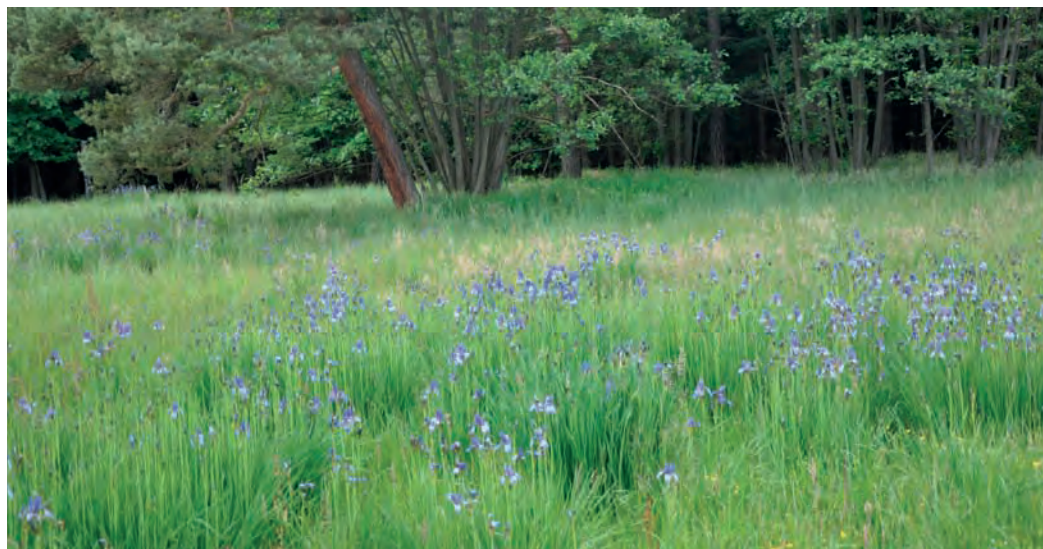
At the end of the season, Průhonice Botanic Garden sells iris rhizomes from iris plants in containers to visitors. It's an interesting one-weekend event for the public which affords them the opportunity to get more information about planting, propagating and growing irises and they also have a chance to buy a broad assortment of irises grown in the garden.

The most visited event in the garden called 'Japanese Day and Perennial Weekend' takes place at the beginning of. Japanese and Czech florists work on the ikebana exhibition. The various presentations are focused on representatives of genus *Iris* in culture.

Trial Garden – since 2013, Průhonice Botanic Garden and MEIS (Middle European Iris Company) have worked on a common project of international importance that aims at testing the quality of modern cultivars in comparison with world-wide varieties and propagating the new-output of breeding of iris varieties. Each year, a group of national iris judges evaluates irises sent to the garden. The first evaluation is two years after the planting of the irises (50 points) in the display and 120 points is awarded to the Champion. The iris evaluation is in accordance with the rules of AIS evaluation. In some years, the garden also organizes a vote for the best iris cultivar for garden visitors as it's situated in the public part of the garden.

Czech National Societies Related to the Iris

On the national level, there are two societies active in organizing iris exhibitions - Gladiris and Iris Hlucin.



Iris sibirica - Natural site Andělské schody, Czech Republic

The National Programme on the Conservation and Utilization of Plants, Animals and Microbial Genetic Resources Important for Nutrition and Agriculture (NP) has included the selection of iris cultivars since 2007. It consists of a collection focused mainly on gene-pool resources of Czech origin. There are records of 486 iris cultivars accessible in the Grin Czech database, preserved under the rules of on farm conservation of the NP. For more details about the genetic resources included in the GRIN Czech database search, see: <https://grinczech.vurv.cz/gringlobal/search.aspx>

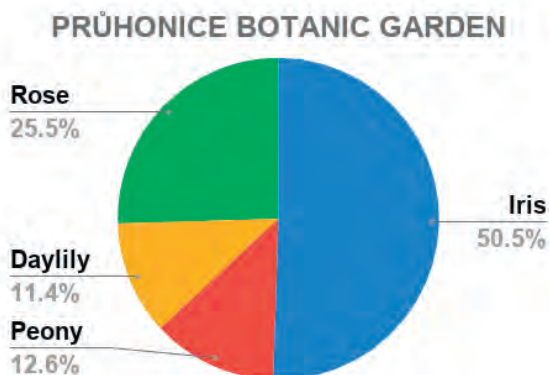
Průhonice Botanic Garden participates in networks of the **Czech Botanical Gardens Union**.

Nurseries Offering Irises in the Czech Republic:

- www.zameckézahradnitví.cz
- www.zahradnictví-špomysl.cz
- www.skolky.cz
- www.irises.cz
- www.kgardens.org by Zdeněk Krupka specialized grower/breeder
- www.lukon-bulbs.cz by Pavel Nejedlo specialized grower/breeder
- www.gladiris.cz by Dušan Slošiar, offering an assortment from all over the world.

Introduction of the Průhonice Botanic Garden Assortment

The iris collection of the Průhonice Botanic Garden – “The Iridarium” is one of the world's largest collections. The conception is unique as it includes typical and non-typical samples of wild species, historical interspecific hybrids and hybrids resulting from Blažek's experimental work done in the garden. But the largest part of the collection consists of a structured set of cultural varieties from the oldest ancient ones among the rarest to the latest novelties. The main purpose of gene pool collection is the preservation of a representative selection of significant individuals involved in the gene pool of the *Iris* genus.



Iris collection:

World and Czech breeding: 2 150 cultivars
Botanical species: 60

The iris collection in Průhonice takes up approximately 50% of all grown assortments of perennials. (Index Plantarum, 2019)

Protected Species of Collections

In the years 2018 – 2012 the Průhonice Botanic Garden has cooperated on a TAČR – EPSILON project aimed at an ex-situ methodology of the conservation of local populations of endangered plant species in changing climatic conditions. We started with the ex-situ preservation of the protected species *Iris pumila*, *I. arenaria* and *I. aphylla* collected from different natural sites in the Czech Republic and included in the Průhonice collection.

One of the species of the Průhonice collection is protected under the Bern convention in Appendix 1. - Strictly protected flora species - *Iris marsica* and *I. arenaria* is involved in European taxa listed under the Directives of the Council of the European Communities. 92/43 / EEC / 1992, it is the endangered taxa of Red Books of Endangered and Rare Plant Species of Czech and Slovak Republics like others such as *I. graminea*, *I. pumila*, *I. variegata* while *I. aphylla* is among the critically endangered species. All mentioned species with *I. sibirica* are taxa protected by ordinance ME 395/1992 Coll.: as §2 - severely endangered in the Czech Republic, only *I. arenaria* is as §1 critically endangered.

Garden Assortment of the irises in the Garden

The conception of individual displays is based on the taxonomy. Many displays of iris varieties in the garden are organized in chronological order. The list of all grown irises in Průhonice can be found on the website: www.florius.cz



QR code for a list of irises grown
in the Průhonice Botanic Garden

- **Wild Bearded Species Display** is the collection of wild species and one of the most valuable parts in the garden as they are mostly collected in natural localities. Some of them are grown in rock gardens and some in a special well drained flower bed with light soil enriched with sand and gravel.
- **Ancient Irises Display** is combined with **Miniature Tall Bearded Irises (MTB)** and **Border Irises (BB)**. The most rewarding is a group of dozens of ancient taxa recorded since 1612, collected mostly by curators of Průhonice Botanic Garden and represented by the group of *Iris pallida* and *I. ×germanica* clones in-

cluding *Iris pallida* 'Dalmatica', *I. ×germanica* 'Florentina' and diploid hybrids (*I. ×squalens*, *I. ×flavescens*, *I. ×neglecta* and *I. ×sambucina*). Another part of the display is dedicated to the MTB irises, their height is between 40 - 75 cm. They are characterized by a larger number of smaller flowers than BB irises. They are about the same size as IB, but with larger flowers. They bloom together with TB irises in the second half of May.



Iris ×germanica 'Florentina coerulea' – ancient cultivar grown in Czech Republic



Iris ×squalens – historic iris grown in Czech Republic

- **Tall Bearded Irises (TB) Display**, their height is more than 75 cm. It's a selection of 900 TB varieties (from the 1 400 cultivars of the collection) including the oldest diploid historic cultivars e.g. 'Swerti' (Swert, 1840). Furthermore the first tetraploid cultivars related to *Iris ×germanica* s.l. and the most numerous group is presented by historic and modern cultivars. The middle triangle display is dedicated to Czech cultivars. They flower from the second half of May (the earliest diploid varieties) to the beginning of June. The peak season is at the end of May.
- **Intermedia Bearded Irises Display (IB)**, their height is between 40 - 75 cm, it's a collection of 160 cultivars (200 cultivars in the whole collection, the oldest variety is 'Dorothea' (Caparne, 1901). They bloom from mid-May in Průhonice.
- **Standard (SDB) and Miniature Dwarf Bearded Irises (MDB) Display**, their height is between 20 - 40 cm. They are represented by 208 cultivars, milestones in breeding, for example the cultivar 'Green Meteor' (Motsch, 1961) with greenish tepals



'Cranberry Ice' (Schreiner, 1973) TB



'Vanilla Ice' (Slošiar, 2013) TB



'Glow Girl' (Blyth, 2012) IB



'Celtic Faerie' (Stewart, 2012) SDB

and the variety with a blue-violet beard 'Gingerbread Man' (Jones, 1968). The smallest bearded garden irises up to 20 cm high are dwarf irises e.g. 'Knick - Knack' (Greenlee, R. 1959) with the white colour of tepals and with light blue-violet veins.

- **Space Age Irises (SA) Display** is a collection of 50 irises with unusual flowers, which have the ends of the beards transformed into horns, spoons or sometimes pompon forms. The American breeders L. & K. Jedlicka donated dozens of SA irises to Průhonice Botanic Garden.



'Pegas' (Šmíd, 1980) SA - cultivar of Czech origin

- **Aril Irises (AR, AB)** represented by a few species in a small rock garden, their hybrids and cultivars of the sections Psamniris (*Iris arenaria*, *I. bloudowii*) and Regelia (*I. hoogiana*, *I. korolkowii*, *I. stolonifera*). The species and cultivars of *Oncocyclus* in general don't survive for a long time in an open area of central European climate. The reason is the low amount of rainfall in the early spring and sometimes too much rain in the summer.
- **Beardless Wild Species Display** consisting mostly of species related to Siberian irises, Crested irises, Spurias and miniature perennial irises like *Iris ruthenica*, evergreen irises like Californian Irises, other species e.g. *I. lactea* clones and *I. foetidissima* with decorative colorful seeds might be seen in different places of the garden.
- **Siberian Irises Display (SIB)**– a collection of 270 cultivars is represented by cultivars from the oldest one 'Snow Queen' (Coll.-Barr, 1900) and the first tetraploids



Roof iris - *Iris tectorum* from the group of crested irises



Iris foetidissima called stinking iris or a roast-beef plant is an evergreen perennial with red seeds



'Yellow Carpet' (Seidl, 2011) SIB



'Princezna Pampeliška' (Blažek, 2013) SPU



'Utamoro' (Grull, 1913) JI (6 F.)

with larger and broader tepals like 'Fourfold White' (McEwen C., 1970) to double flowered forms like 'Rigamarole' (Bauer and Coble, 2000).

- **Spuria Irises (SPU) Display** is represented by 40 cultivars from Milan Blažek's selection work from 1980 - 2015. The collection includes also a few international cultivars.
- **Water and Japanese Irises (JI) Display** is represented by water irises like *Iris versicolor*, *I. laevigata* and their hybrids and cultivars (about 45 taxa). In additional 120 cultivars of Japanese irises include also one species *I. ensata* var. *spontanea* and the oldest JI cultivar 'Triomphe' (Barr, 1903).
- **Bulbed Irises Display** includes species and cultivars of the Scorpiris subgenera like *Iris graeberiana* 'Yellow Fall' and 'Alba', *I. bucharica* 'Dushanbe', *I. magnifica* 'Agalik' and *I. cycloglossa*. Very ornamental, reliably hardy plants of the Hermodactyloides subgenera are already in bloom in February as cultivars of *I. reticulata*, *I. winogradowii* and their hybrids with *I. histrioides*. Dutch bulbed irises are less decorative here as the cultivars of the Xiphium subgenera are not reliably hardy in Průhonice, and they are eaten by rabbits. This causes that they almost never bloom.



Iris magnifica - magnificent iris (bulbed Scorpiris cultivar)



Iris reticulata 'Harmony' - bulbed cultivar flowering already in February/March

- **Trial Garden Display** shows new varieties mostly in the *Iris barbata* group from different breeders related to the Middle European Iris Society. They undergo evaluating for three years before reaching the final judgement and feedback for the breeders.



'Birgit' (Nejedlo, 2017) BB



'Hrom a Blesk' (Seidl, 2015) TB

- **Louisiana Irises Display** is located in one pond in the garden and cultivars and hybrids of *Iris versicolor* are located in another pond. The plants are grown in big pots. During the season at least $\frac{1}{3}$ of the leaves are under the water level and the rest above. In winter, the pots are deeper in water, only $\frac{1}{3}$ of the leaves are above the water.

Czech National Breeding

National breeding began in the sixties, when the first large-flowered bearded irises were brought to Czechoslovakia. The deliberate experimental crossing at the scientific level took place under the leadership of Milan Blažek at the Institute of Botany of the Czechoslovak (since 1990 Czech) Academy of Sciences in Průhonice. Blažek's interesting varieties were awarded at competitions in Vienna, Florence and Erfurt. He succeeded with the first salmon pink varieties of IB irises of the Czech Republic such as 'Zlom' (1970) and 'Meruňka' (1968). His awarded TB



Iris fulva 'Little Cajun' (Tony Avent, 2010) LA

varieties include known and still grown ones, e.g. the brown violet *plicata* variety 'Alena' (1973) and the variety with ruffled tepals as pure white 'Lavina' (1980). The first registered Czechoslovak cultivar is 'Irenka' (1969).

Milan Blažek was working on selecting *Spurias* seedlings with the aim of manifesting the variability of concurrent *Spurias* hybrids. The most interesting variety is 'Rozmar' (Blažek, 2013) with doubled flowers. Among the white flowered varieties with a yellow signal on the falls, the 'Bílé vlny' (Blažek, 2013) variety with the most ruffled tepals edges and the earliest 'Bílá kytice' variety (Blažek, 2013) are dominant. Among darker varieties, the violet-blue variety with a distinctive bronze signal 'Modrá paleta' (Blažek, 2013) and 'Tajemství' (Blažek, 2013) are interesting. Around 40 varieties were registered in 2013 but their introduction started earlier in 1980.

The breeding development of bearded irises is remarkable in the increasing size of the tepals. The inner tepals were tightly close to slightly overlapping. Nowadays, irises with wide open inner tepals are very trendy. In the beginning, Czech breeders tried to reduce the veins in the outer tepals but nowadays the contrasting veins are evaluated positively.

In the seventies, when irises were the most popular, the successful amateur breeder Vojtěch Šmíd entered Czechoslovak breeding, winning first place (the Premio Firenze) in the iris competition in Florence in 1985 with the SDB variety 'Libon'.



'Kytice' (Blažek, 1966) TB



'Zlom' (Blažek, 1970) IB was awarded in the Zwergiris competition in Vienna in 1983



'Alena' (Blažek, 1977) TB was awarded as first Czechoslovak cultivar in competition in Florence



'Irenka' (Blažek, 1969) TB first registered Czechoslovak cultivar



'Tajemství' (Blažek, 1993) SPU awarded as Champion in Trial Garden in Průhonice



'Bílé vlny' (Blažek, 1993) SPU awarded as Elite in Trial Garden in Průhonice

Another Czech breeder Zdeněk Krupka breeds especially SDB irises and one of his varieties 'Believe in Miracles' (Krupka, 2009) was awarded as the Champion in the Průhonice Trial Garden.

Pavel Nejedlo's varieties have been valued due to the orange-red beard e.g. 'Centrifuga' (1988) TB.

Since the new millennium, the combination of dark purple (almost black - violet coloured tepals) with a red beard have appeared in the world, but not yet in the national breeding. Although the rewarded variety 'Hrom a Blesk' (Seidl, 2015) has the most extreme contrast of very dark violet with a deep yellow beard.

Awarded irises of MEIS origin include extra ordinary cultivars with a reverse combination of color as 'Natasha N. ' (Nejedlo, 2002), a reverse two-tone pink cultivar with a coral pink beard, in addition a wine-colored cultivar with a significant white mirror 'Forest of Tjaru' (Krupka, 2010) or the white curly cultivar 'Papapubren' (Dudek, 2004).

Among the current Czech breeders, Zdeněk Seidl has received the most international awards. At the competition in Florence (Italy) he won first Gold Florin for the Space Age variety 'Chachar' and the TB variety 'Ogar' (2014). He got the gold medal for the cultivar 'Deep Blue Waves' (2006) at the Munich Iris competition.



'Mnich Řehoř' (Šmíd, 1970) TB



'Believe in Miracles' (Krupka, 2009) SDB
awarded as Champion in Průhonice
Trial Garden



'A.E. Silva' - Tarouca' (Krupka, 2020) TB



'Centrifuga' (Nejedlo, 1988) TB



'Bratislavská noc' (Seidl, 1987) TB awarded by MEIS Carpathian Medal



'Blue Lasso' (Seidl, 2011) TB

In recent years, he registered around 30 JI cultivars e.g. blue 'Depth Among Flat' (2013), and the red-violet variety 'Hefaistos', (2013), the yellow signal is surrounded by "blaze". He also focuses on breeding SIB varieties, e.g. with yellow markings such as 'Yellow Carpet' (2011) and a cultivar with a flat-shaped flower 'Spread Butter' (2015). The two-tone variety 'Seeing Red Star' (2011) impresses with its reddish-purple falls.



'Silesian Flash' (Seidl, 2011) JI awarded as Elite in Průhonice Trial Garden



A list of Recommended Czech Cultivars:

1. 'Bratislavská noc' (Seidl, 1987) TB - very vigorous, dark purple variety.
2. 'Blue Lasso' (Seidl, 2011) TB - Elite award for a bi-color variety of white and blue with an orange beard in the Průhonice Trial Garden.
3. 'Kytice' (Blažek, 1966) TB - very vigorous violet-white plicata variety.
4. 'Mnich Řehoř' (Šmíd, 1970) TB - colour-rich variety of the purple-white plicata type with dark purple veins
5. 'Centrifuga' (Nejedlo, 1988) TB - pale violet variety valuable for orange-red beard
6. 'Believe in Miracles' (Krupka) SDB - awarded as Champion in the Průhonice Trial Garden.
7. 'A.E. Silva-Tarouca' (Krupka, 2020) TB - very vigorous light-blue variety
8. 'Pozdrav ze Zbuzan' (Blažek, 2013) BB - very dark-violet variety with an extreme yellow beard
9. 'Silesian Flash' (Seidl, 2011) JI - blue falls, dark-blue veining and a blue halo around the bright-yellow signal won the Elite award in the Průhonice Trial Garden.
10. 'Tajemství' (Blažek, 2013) SPU - the most extraordinary dark blue variety awarded as Champion in the Průhonice Trial Garden.

Maintenance of the Iris Collection in Průhonice.

Climatic conditions

- Climate: humid continental (Köppen climate classification Dfb)
- Average annual temperature: 8,5°C
- Hardiness zone: 6b
- Average annual rainfall: around 570mm
- Altitude: 305m above sea level
- Soil types: modal brown soil, gleyed brown soil is present

Basic Maintenance of Irises in Průhonice Botanic Garden

Besides the public part (the Iridarium), there is the iris field collection in the working part of the garden that serves as a reserve gene pool bank for iris taxa. There are at least two cultivated fields with about 1,800 cultivars (bearded irises) planted in chronological order. Another field with green fertilizing (Lucerne) is mown twice a year in a 4-year period to be regenerated for the future planting of irises.



- Transplanting period - irises require regular transplanting after 6 years. It is recommended after 4 years, but with good care and enough grow space it is possible even after 8 years.
- Winter treatment - it is recommended to cover weak or small plants for winter for frost protection, especially recently transplanted plants of beardless irises, then not reliably winter hardy bearded irises like *Iris albicans*, *I. arenaria*, *I. lutescens*, *I. billotii* and some representatives of the *Oncocyclus* section.
- Spring cleaning - it is necessary to remove dry foliage already during autumn and repeat it in spring together with the first early weed control. Both cleanings are necessary. No cleaning would result in a higher occurrence of fungal diseases of rhizomes and the death of the plants.
- Fertilizing - very early application of dolomitic limestone and early spring application of complete Cererit fertilizer (NPK (+MgO, +S) 8-13-11 (+2, +15) with B, Cu, Mo and Zn) for bearded and bulbed irises. For beardless irises, in the second year after transplanting and then each year.
- Dead-heading - not performed, after all plants finish blooming and before seed pods are ripe, stalks are removed. Seedlings from open pollination can degrade the high standards of gene pool collection and discredit the verification of species and cultivars.
- Pests - aphids are not significant to a certain extent, Iris Bud Fly - *Acklandia servadeii* can damage buds, opening flowers in color and shape. Flea Beetle - *Aphthona nostrata* can damage foliage, the application of Nurelle D (chlorpyrifos + cypermethrin) in combination with Decis Mega, Decis 15 EW at least twice a season is the solution. Roe deer, hares, rabbits – the only effective protection has proved to be a solid fence.
- Diseases - Leaf Blotch caused by the *Helminthosporium gracile* pathogen is significant, regular need for treatment with Fungicides such as Dithane DG Neotec, iris rust - present on JI and SIB irises, requiring treatment with Horizon 250 EW, Iris mild mosaic virus – IMMV and Iris severe mosaic virus – ISMV cause a significant reduction of plant vitality - no chemical treatment is effective, Iris rhizome rot cause by *Botrytis convoluta* is treated by Fungicides as Kuprikol, Dithane DG Neo - Tec, *Pectobacterium carotovorum* causes Bacterial Soft Rot, shallow planting and a sufficient supply of phosphorus, non-fertilization with nitrogen and soil drainage help more than chemical treatment.
- Weed control – after the early season cleaning of dry foliage, the first weeding follows along with soil cultivation and the application of pre-emergent herbicide e.g. Stomp, Sharpen. During the vegetative season, the spot treatment of persistent weeds is performed with the glyphosate Roundup or Figaro.



Common name for *Iris graminea* is Grass leaved Iris or Plum Iris (for the scent)



University of Wrocław Botanical Garden, Poland

History and Traditions of Iris Growing in Poland and in the University of Wrocław

The history of iris cultivation in the **University of Wrocław Botanical Garden** began with the enlargement of the area and the creation of a new department of Ground Ornamental Plants with the aim of promoting decorative garden plants. In the mid-1960s, irises were brought to the garden by Dr. Gumińska from an American gardening company - Gilbert H. Wild & Son. They were one of the first plants purchased for the newly created foreign department, which was a great achievement at the time. They were planted on newly created flower beds, according to the design of the botanist Mieczysław Tokarski, and were made on the ruins of tenement houses. The fertile soil mixed with the rubble created permeable ground in an open space, rich in sunshine. These conditions turned out to be ideal for the development of the iris collection.

The collection was significantly expanded in 1988. The University of Wrocław Botanical Garden received about 30 varieties of irises from the TB group from a liquidated collection of registered varieties of ornamental plants belonging to the Department of Experimental Variety Assessment in Śrem Wójtostwo. Among others, the TB cultivars: 'Stepping Out' (Schreiner, 1964), 'Prince Charles' (Zurbrigg, 1959), 'Książę Pepi' (Marcinkowski-Marczyński, 1976), 'Arkady' (Marcinkowski) along with 'Parc de Neuilly' (Verdier, 1910) and 'Bonnieblue' (Sturtevant, 1928) from the IB group.

The largest expansion of the iris collection in the botanical garden in Wrocław took place in 1998-2003. One hundred and twenty-five iris cultivars from the standard dwarf bearded group (67 varieties), intermediate bearded irises (4 varieties) and tall bearded irises (54 varieties) were acquired from the Polish breeder, Jerzy Woźniak from Rybnik. The collection was enriched by such varieties as: 'Bałtyk' (Woźniak, 2003), 'Fancy Women' (Keppel, 1995), 'Celebration Song' (Schreiner, 1993), 'Tennessee Women' (Innerst, 1990). Private breeders supported the garden in the development of the collection. In 2003, Mr. and Mrs. Osmelak from Wrocław donated 16 varieties of irises from the tall bearded group, including 'Peking Summer' (Schreiner, 1983) and 'Thornbird' (Byers, 1988). The collection was also complemented by single plants, obtained from other botanical gardens, private collectors, and irises bought in nurseries.

The aim of the collection, from the beginning of its existence, was to promote decorative plants in horticulture. In the past, educational walks with the collection curators were organized in our garden during the period of iris blooming.

Since 2019, the University of Wrocław Botanical Garden has been a member of the Middle European Iris Society.

Irises (*Iris*) were cultivated in the University of Wrocław Botanical Garden - **Arboretum Wojstawice** as early as in the 19th century. The collection was initiated by Fritz von Oheimb - the owner of the Wojstawice estate. He planted various species and varieties of both perennials and trees on the banks of ponds, and enjoyed the reflection of plants on the water surface.

A large group of Japanese irises *Iris ensata*, together with another Japanese iris also called rabbit-ear iris *I. laevigata* surrounded the pond with water lilies.



Iris ensata (syn. *I. kaempferi*) in Wojstawice, 1920. (Archives the Arboretum Wojstawice)



Irises in Wojstawice, 1920. (Archives the Arboretum Wojstawice)

Iris Projects and Organizations in Poland

Arboretum and Department of Physiography in Bolestraszyce - Collection of the Genus *Iris Series Laevigatae*

The national collection of irises from the *Laevigatae* group in the Arboretum and the Department of Physiography in Bolestraszyce near Przemyśl was approved in 2007, covering 152 different species and varieties. Visitors can admire different groups of irises in the Arboretum, in different places, which are related to their specific requirements and blooming season. Intermediate and tall bearded irises can be found at the main entrance and in close proximity to the church, and miniature bearded irises can be found in the rock garden, next to the large outbuilding.

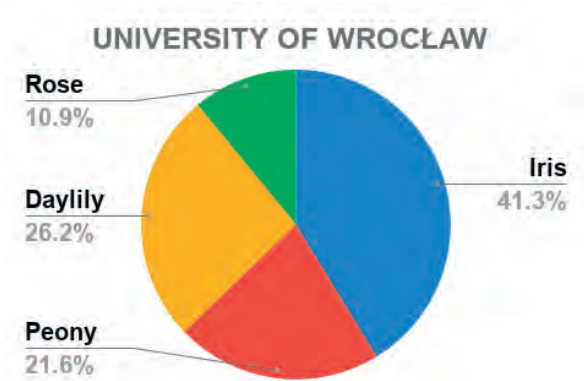
Irises which prefer a water environment grow in the coastal zone of the medium and large pond and in moist meadows behind the heath and under a beech slope near the exposed trunks of black oak. A group of yellow irises *I. pseudacorus* can be seen near a large pond on the castle clearing.

A significant collection of irises can also be admired at the Stefan Białobok Forest Arboretum in Stradomia Dolna.

Nurseries Offering Irises in Poland:

- Arboriculture Nursery - Irises, Daylilies, Dahlias
Władysława Żukowska & Jerzy Byczyński, www.ild-flowers.eu
- Irisland Zalewska, Katarzyna Zalewska, <http://www.irisland.eu>
- Moje irysy, Waldemar Zasowski, <http://www.mojeirysy.pl/>
- Robert Piątek, <https://www.facebook.com/robert.piatek.52>
- Hortipol Horticultural Farm, Agnieszka and Patrick Brama
http://hortipol.com.pl/?page_id=558

Introduction of the Iris Collection of the University of Wrocław Botanical Garden



Iris collection includes: 392 taxa

Bearded irises: 361 varieties

TB: 258 varieties

SDB: 95 varieties

IB: 8 varieties

Other: 31 taxa

Bearded irises are the most numerous group of the iris collection in the garden. They thrive the best on highly permeable, neutral or slightly alkaline soils in a warm and sunny position.

At the turn of spring and summer, during abundant blooming, bearded irises are the main attraction of the garden.



'Bedford Lilac' (Jones, 1990) SDB



'Dark Vader' (Miller, 1987) SDB



'Firestorm' (Smith, 1994) SDB



'Pal Sam' (Gatty, 1986) SDB



'Wild Ginger' (Gibson, 1960) TB



'Derive' (Anfosso, 1991) SDB



'Irish Moss' (Jones, 1993) SDB



'Amazon Princess' (Nichols, 1971) SDB



'Rita Kinsella' (Briscoe 1984) SDB



'Stockholm' (Warburton, 1971) SDB



'Open Sky' (Warburton, 1975) SDB



'Two Rubies' (Niswonger, 1989) SDB



'Starbaby' (Smith, 1993) SDB



'Dusky Challenger' (Schreiner, 1986) TB

The remaining species of irises, consisting of 31 taxa, have been collected in the Plant Systematics section. They originate from the following species:

1. *Iris chrysographes* – 1
2. *Iris delavayi* – 1
3. *Iris domestica* – 1
4. *Iris ensata* – 7
5. *Iris germanica* – 1
6. *Iris graminea* – 1
7. *Iris halophila* – 1
8. *Iris japonica* – 1
9. *Iris laevigata* – 1
10. *Iris lactea* – 1
11. *Iris louisiana* – 2
12. *Iris pallida* – 1
13. *Iris pumila* – 1
14. *Iris pseudacorus* – 1
15. *Iris ruthenica* – 1
16. *Iris sanguinea* – 1
17. *Iris sibirica* – 2
18. *Iris spuria* – 1
19. *Iris variegata* – 1
20. *Iris versicolor* – 3



Hungarian iris (*Iris variegata*)

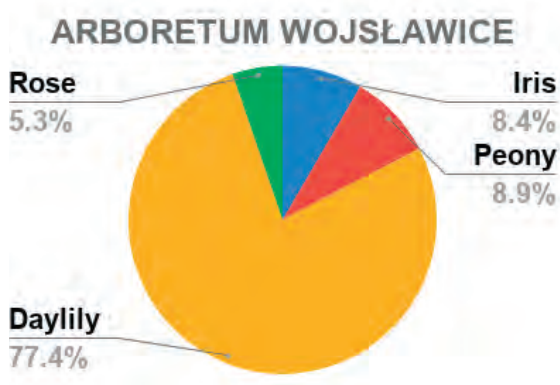


Iris lactea commonly known as the white flowered iris or as the milky iris



Dalmatian iris or sweet iris *Iris pallida*

Introduction of the Iris Collection of the University of Wrocław Botanical Garden - Arboretum Wojsławice



In 2020, the collection is composed of:

14 species
 2 subspecies,
 2 inter-species hybrids
 368 varieties, including 241 Polish varieties

Tall bearded irises - 148 varieties

Dwarf bearded irises - 40 varieties

The actual collection of Irises in the Arboretum Wojsławice has been being developed systematically since 1994.

The collected irises are derived from the following species:

Iris × robusta – 2 varieties

Iris chrysographes – 2 var.

Iris ensata – 27 var.

Iris japonica – 1 var.

Iris laevigata – 4 var.

Iris pallida – 2 var.

Iris pseudacorus – 16 var.

Iris setosa – 2 var.

Iris sibirica – 68 var.

Iris spuria – 6 var.

Iris versicolor – 9 var.

Iris virginica – 1 var.

Irises not included in any of the groups consist of 40 taxa.



'Abundant Display' (Walter & Hager, 1985) JI



'Blaudom' (Steiger, 1958) JI



'Epimetheus' (Innerst, 1991) JI



'Purple Parasol' (McEwen, 1971) JI



'Queen's Tiara' (unknown) JI



'White Lady' (Malmo, 1929) JI



'Red Dazzler' (Hale, 1969) LA



'Burnished Brass' (Roe, 971) SPU



'Limeheart' (Brummitt, 1968) SIB in Arboretum Wojstawice


The latest collection of irises - the achievements of Polish breeding, mainly from tall and dwarf bearded groups - is located in the Polish Millennium Garden. The perennials growing there were planted in groups, the breeder was taken as the criterion for distribution.

Older collections are scattered throughout the Arboretum and are located on perennial flower beds and on sections adjacent to the ponds.

Iris Protected Species in the Arboretum

Particular attention should be paid to the grass leaf iris *Iris graminea*, considered RE (regionally extinct) in Poland, which, grown from seeds (obtained from a natural site), has been cultivated in the Arboretum for more than 20 years. The natural range of occurrence of *I. graminea* is the Caucasus and areas of southern, south-eastern and central Europe. In Poland, it was found only in the Cieszyn Foothills on Mount Tuł and in the vicinity of Brenna and Cisowica.

Siberian Iris *Iris sibirica*, cultivated in the Arboretum since 1998, is under strict species-specific protection in Poland. It is a vulnerable species (VU category) in Poland. Its natural habitat covers central and western Europe, Turkey, Caucasus and Siberia. In Poland, it occurs rarely, however, it can be found in the whole territory of the country.



In 2019, a maintenance tillage of the leafless iris *Iris aphylla* was established in the Arboretum Wojstawice. The species occurs in Central and Eastern Europe, the Caucasus and Asia Minor. In Poland it has a few stands, mainly in the southern part of the country. The seeds were collected in the Biała Góra nature reserve - a steppe nature reserve in the Kozłów commune, in the Miechowski district, in the Małopolskie voivodeship. It is under strict protection and a species threatened with extinction (VU) in Poland, and an extinct species (RE) in Lower Silesia.



Iris aphylla has several common names: naked stalked iris, leafless iris or stool iris

An online list of irises growing in the Arboretum Wojstawice:

<http://arboretumwojstlawice.pl/index-plantarum/index-plantarum-byliny/>



Polish National Breeding of lirlses

The pioneers of Polish iris breeding were: Stefan Makowiecki (1860-1949), to whom we owe, among other things, the 'Anka' cultivar from the tall bearded group; Antoni Wróblewski (1881-1944); Zygmunt Hellwig (1899-1958) who bred the 'Brda' variety and the Siberian iris 'Grażyna' as well as the only woman active in iris breeding during the inter-war period, Stanisława Lenkiewiczówna (1883-1963). The 'Solenizant' variety comes from her breeding. All the varieties mentioned above disappeared during the war turmoil and are still searched for nowadays.

In the 1970s and 1980s, four cultivars of lirlses were bred at the Institute of Pomology and Floriculture in Skierniewice: Jacek Marcinkowski and Szczepan Marczyński came up with the 'Księżę Pepi' variety in 1977 and Marcinkowski himself introduced 'Księżna Łowicka' in 1983. Bolesław Chlebowski bred the 'Stanisława' and 'Edward' varieties in 1983 (lost today).

A new chapter in Polish iris breeding began in 1997, when Lech Komarnicki (1934-2015) registered the first Polish TB cultivar 'Biała Noc' in the American Iris Society (AIS). In total, he registered over 150 varieties from all iris groups in the AIS. Other Polish breeders can also be found in the AIS register: Henryk Polaszek ('Biała Polana', 2004), Franciszek Stania ('Bornholm', 2000), Zbigniew Kilimnik ('Biały Łabędź', 2008), Józef Koncewicz ('Buziaczek', 2014), Stanisław Nosek ('Babie Lato', 2014), Jerzy Woźniak ('Baca', 2002), Robert Piątek ('Polish Debutante', 2010), Jacek Kulesza ('Homeopaths', 2002). Some Polish breeders can be proud of the great achievements of registered varieties. The following breeders, among others, can be listed: Anna Cadd ('Ballerina's Pirouette', 2004), Katarzyna Kat Zalewska ('Borgia Dreams', 2015), Jolanta Piątek ('Szept Namiętności', 2018) and Magdalena Kulig ('Bibice Sky', 2016).



'Aaricia' (Piątek, 2018) TB



'Anna-Rosa' (Zalewska, 2018) TB



'Burdasz' (Nosek, 2010) TB



'Ecuadorean' (Piątek, 2018) TB



'Etsitu' (Piątek, 2013) TB



'Hala Kulik' (Piątek, 2014) TB



'Isobel Padden' (Zalewska, 2016) TB



'Medieval Legend' (Piątek, 2017) TB



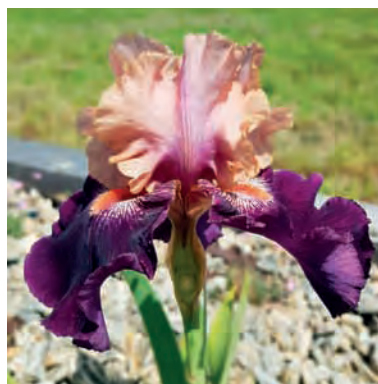
'Nature Whispers' (Piątek, 2017) TB



'Nieboskłon' (Piątek, 2017) TB



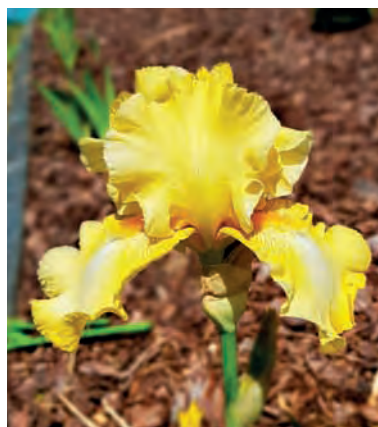
'Sky Two Worlds' (Piątek, 2019) TB



'Wezuwiusz' (Piątek, 2014) TB



'Władysław' (Byczyński, 2001) TB



'Złotko' (Kilimnik, 2006) TB



Recommended Polish Varieties of Irises

1. 'Aaricia' (Piątek, 2018) TB – cream-yellow, pronounced smoky violet veins, higher veins turn yellow; style arms yellow and lavender; falls dark lavender turning pale violet-blue, maroon hafts at beards; beards based lavender, tips yellow; ruffled.
2. 'Bałtyk' (Woźniak, , 2003) TB – light blue orchid, base deeper; falls silvery white, large washed spot light blue orchid; beards light blue, light yellow in throat; heavily ruffled.
3. 'Czarna Madonna' (Kilimnik, 2007) TB – deep violet-purple; style arms deep violet-burgundy; falls nearly black deep violet-purple, velvety; beards deep-violet; ruffled.
4. 'Fantasy Dream' (Piątek, 2012) BB – light pink, cream-yellow center; style arms cream-yellow; falls snow-white, delicate light pink tinge, 1/4" wide cream-yellow halo; beards red in the throat, light red in the middle, orange at the ends.
5. 'Henryk Sienkiewicz' (Kilimnik, 2016) TB – lavender-violet, narrow dark violet edge; style arms violet-lavender, brown serration; falls dark velvet purple, narrow lavender-violet edge, dark purple veining on lighter base around beards; beard hairs based cream, honey tips, crinkled petals.
6. 'Jezioro Trzech Rzek' (Komarnicki, 2008) SPX – light lavender-blue; style arms pale pink, lavender blue ribs; Falls deeper lavender-blue, white rays around prominent yellow signal, long white center stripe.
7. 'Mandarin Sky' (Piątek, 2017) TB – dark peach-orange, salmon base; style arms orange; falls dark velvet purple, ruffled; beards bright orange.
8. 'Polonia' (Kilimnik, 2011) TB – standards and falls white, wavy and laced; style arms white, laced; beards creamy white base tipped red orange.
9. 'Remember Inka' (Zalewska, 2017) SDB – very vigorous, deep red with violet beard.
10. 'Szafiry Koronne' (Komarnicki, 2003) SDB – white, light yellow spray on midrib, light yellow veins fading to white; style arms white; falls white, light yellow veins fading to white; beards blue, hairs tipped white; tailored.




Maintenance of Irises in the University of Wrocław Botanical Gardens

Climatic Conditions

- Climate: temperate oceanic (Köppen climate classification Cfb)
- Altitude:
Arboretum Wojstawice 213 to 320m above sea level
BG in Wrocław 116 to 120m above sea level
- Average annual temperature:
Arboretum Wojstawice 8°C
BG in Wrocław 8,4°C
- Hardiness zone:
Arboretum Wojstawice 6B
BG in Wrocław 7A
- Average annual rainfall:
Arboretum Wojstawice – around 571 mm
BG in Wrocław – around 551 mm
- Soil types:
Arboretum Wojstawice – dominant acidic brown soil (pH 3.8-4.7)
BG in Wrocław – largely changed – artificially imported, alluvial

Basic Garden Maintenance of Irises in the University of Wrocław Botanical Gardens

- Weeding - the care of the flower bed with the irises consists mainly of weeding, which allows, both, the sun to reach the tops of rhizomes, and the aesthetic display of the collection.
- Removing spent flowers and cleaning the plants - the blooming period lasts from April (dwarf bearded irises) to June (tall bearded irises). During this effective stage of vegetation of these perennials, blooming flowers are removed on an ongoing basis. After this period, we cut the whole stem down to the ground. In autumn, leaves of irises are cut to 10-15cm. This treatment facilitates the plants being prepared for winter dormancy.
- Dividing and transplanting rhizomes - irises, like many other perennials, do not stay in one place for many years, but constantly, though slowly, "wander" in search of a free place and soil rich in nutrients. New rhizomes grow from the inside out of the clump. In a too dense clump, many rhizomes are formed, but they are weak, most of which do not reach the size necessary to form flower



shoots. To avoid this situation, it becomes necessary to dig out the whole clump and split it up every three years. New, healthy and strong rhizomes are selected to be planted out.

- Planting method - we observe the most abundant blooming of irises in the second year after they have been planted. By the end of July, we change their position, rejuvenating the plants by division. We plant them shallow, so that one third of the rhizome is sticking out of the ground, with 30 cm spacing. We plant the best, healthy young rhizomes in groups of a dozen or so pieces.
- Infected specimen are disposed. If there is a surplus of plants, we donate them to other botanical gardens or arboreta. The flower beds on which we plant irises are very sunny with fertile and permeable soil of a neutral pH value.
- Watering - we water irises only during the blooming period and during a prolonged drought.
- Fertilization - Potassium and phosphorus fertilization is applied once a year before the perennials bloom.
- Pests and diseases - fungal leaf disease sometimes appears on tall irises. This is a gangrene spot of *Mycosphaerella macrospora*. The symptoms of the disease are aggravated by rainy weather, fog, a humid site of cultivation and a calcium deficiency. The annual occurrence of the disease leads to weaker blooming and, after a few years, to plant stunting. We use Thiophanate-methyl or Azoxystrobin to combat this disease. Above all, however, we try to prevent the development of plant infections by removing infected and old remains of leaves. Furthermore, on dwarf bearded irises, Iris aphid *Aphis newtoni* appears at the end of blooming. As a result of feeding aphids, the plants are strongly weakened. We use Acetamiprid spray to control this pest.



Vilnius University Botanical Garden, Lithuania

History and Traditions of Growing Irises in Lithuania and in Vilnius University Botanical Garden

It is difficult to determine exactly when flower gardens appeared in rural homesteads in Lithuania. Probably around the 15th-16th centuries after the Wallachian Revolution. The management of homesteads in particular became more active after the abolition of serfdom in 1861. Seeing the well-kept manor parks and ornate alien plants growing there, the peasants wanted to replicate it in their homesteads in a miniature fashion. Easily reproducing flowers spread from mansions and monasteries and from one homestead to another.

Most of them were perennials which needed a minimum of maintenance or annual as well as biennial flowers which disseminate completely by themselves. It is known that irises started to be grown a long time ago in Lithuania as decorative plants, although the diversity of the *Iris* genus only began to increase rapidly in recent decades. Hybrid bearded iris cultivars, especially tall bearded iris, have been cultivated the most, others less frequently. Tall bearded irises were traditionally grown in flower beds.

In the beginning of the 20th century, irises were widely cultivated for their beautiful flowers and leaves. At that time, the color of the iris flower garden consisted mostly of yellow, blue, purple and blue\white flowers. They were planted in nurseries, around crosses, in gardens by paths, around the house usually close to the foundation of the house. The breeding of iris started in 1929-1930.

In Lithuanian wet forests, wetlands, rivers and lakeshores and wet meadows, only two species - *Iris sibirica* and *I. pseudacorus* grow naturally. In 1962, *I. sibirica* was included in the List of extinct and endangered species of Lithuania. Assigned as a 2 (V) category (vulnerable).


The story of the iris collection in the Vilnius University Botanical Garden in Kairėnai began in 1992 when the first herbaceous ornamental plant collections were planted. The following flower breeders gladly donated plants to Vilnius University Botanical Garden: P. Balčikonis, A. Gražys, O. Griniuvienė, J.A. Liutkevičius, G. Klimaitis, J.E. Tarvidas, E. Tarvidienė and D. Žigarienė. Other plants for collection were given by the Vytautas Magnus University Botanical Garden and the Šiauliai University Botanical Garden.



Guide walk focused on irises in Vilnius University Botanical Garden



Part of *Iris* collection in Botanical Garden



The Purposes of Growing Irises in the Vilnius University Botanical Garden

Botanical gardens have had a changing role throughout history. At the present time, the main purpose of iris collections in Vilnius University Botanical Garden is to collect cultivars of iris suitable for growing in Lithuanian climatic conditions. In addition, to collect a variety of decorative diversity as well as a diversity of the *Iris* genus. One of the main goals is to present Lithuanian iris cultivars. The mission of iris collections is to increase scientific knowledge, contribute to biodiversity conservation, to promote the value of biodiversity to the visitors, and to develop techniques for the collecting, planting and reintroducing of plants. Horticulture and cultivation skills enable botanical gardens to grow plants that might be lost in nature. So, it is important to share good practices and raise awareness about plant conservation.

Every year, the botanical gardens organizes a public educational event at the beginning of June (the peak of iris flowering) for visitors, garden enthusiasts, or professional plant growers. During the educational event, the general public has the opportunity to get to know different species and varieties of irises and learn



'Crinoline' (Schreiner, 1965) TB



'Keružis' (Liutkevičius, unknown) TB

a lot of useful information about the breeding and maintenance of these plants. Moreover, irises have the potential to be used in aromatherapy. Young garden visitors are usually curious to smell iris flowers. Some potential therapeutic plants can be found in the Vilnius University Botanical Garden like the TB cultivars: 'Old Black Magic' (Schreiner, 1996); 'Before the Storm' (Innerst, 1988), 'Crinoline' (Schreiner, 1964) and Lithuanian cultivars with a strong, but pleasant smell e.g. 'Felixas' (Žigarienė, 1999), 'Šventaragis' (Liutkevičius, unknown), 'Saulėtekis' (Liutkevičius, 2006), 'Keružis' (Liutkevičius, unknown), 'Stanislava' (Gražys, unknown), 'Ūkas' (Klimaitis, 2000) and others.

Iris Projects and Organizations in Lithuania

Iris collection in the Vilnius University Botanical Garden has faced many changes over time. This is the main reason why the collection has just recently begun to grow and expand.

The organization which Vilnius University Botanical Garden participates in is the Middle European Iris Society, also known as - MEIS. The society brings together breeders from European countries with other people who collect, research and create new varieties of iris. In 2018, a MEIS general meeting took place at Vilnius University Botanical Garden in Kairėnai.

In 2002, the Ministry of Environment of the Republic of Lithuania together with the Ministry of Education and Science of the Republic of Lithuania assigned the



Middle European Iris Society meeting in Vilnius University Botanical Garden in June 2018

functions of the ornamental plant coordination center to Vilnius University Botanical Garden. The Ornamental Plants Coordination Center is responsible for collecting, researching, preserving and using the genetic resources of ornamental plants and for collecting the results of the use and conservation of these resources. Vilnius University Botanical Garden has accumulated a valuable and rich ornamental plant gene pool, with over 7,000 ornamental plants currently. The most valuable of them have been granted the status of national genetic resources of plants by order of the Minister of Environment of the Republic of Lithuania. A total of 38 Lithuanian irises from the following breeders have been included in the gene bank:

- Jono – Auksuolio Liutkevičiaus: 'Jonas Biliūnas' (1996), 'Jovaras' (1999) and 'Drakonas'
- Dalios Žigarienės: 'Feliksas' (1999), 'Ritos Brolis' (1999), 'Vaiva' (1998), 'Snaigė' (2003), 'Žiemos Rytas I' (1998)
- Onos Griniuvienės: 'Afrikietė' (1980), 'Karalienė Ayshwaria' (2003), 'Nauja Era' (2002), 'Rudenėlis' (1986)
- Jono Evaldo Tarvido: dateless varieties 'Radyns', 'Senolis', 'Sveikuolis', 'Švelnutis'
- Petro Balčikonio: 'Danutė' (1997), 'Laisvė' (1997) and 'Raudonbarzdis' undated
- Algirdo Gražio: 'Algirdas' (2004) and dateless 'Juozapas', 'Stanislava'
- Gintaro Klimaičio cultivar: 'Ūkas' (2000)



'Algirdas' (Gražys, 2004) MDB

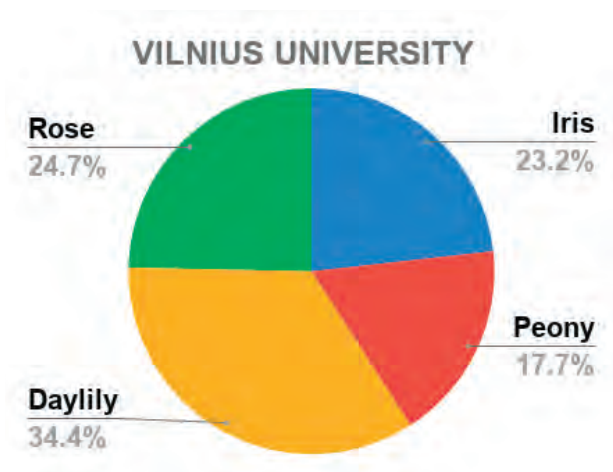


'Stasys Lozoraitis' (Liutkevičius, 2006) TB



'Jovaras' (Liutkevičius, 1999) TB

Introduction of the Vilnius University Botanical Garden Iris Assortment



At the end of 2019, there were 251 cultivars from 63 species of the *Iris* genus.

The first iris appeared in Vilnius University Botanical Garden in 1992. This was followed by many years of searching, collecting and exchanges on a local and international scale for the purpose of creating a collection of plants. Without the diligent work of iris collection curators, it would not consist of such a wide range of colors and diversity, enjoyed by the garden visitors. We can say that these plants are not only beautiful additions to our garden but always hold a place in our lives.

The first nine irises in the garden appeared in 1992. It should be noted that all nine irises are still successfully growing in our garden. Most of the plants were received in 2014. According to the country of origin, it can be seen that most of the plants came from the Czech Republic 40.1%, irises from Lithuania make up 26.3% of the collection. From the Russian Federation, the botanical garden received 5.9%. From Poland 7.1%, while 5.3% of the irises were received from Latvia and 3.8% from Germany. Irises from other countries make up a smaller percentage of the collection. Various cultivars were obtained in the form of living plants (rhizomes and bulbs) from specialist nurseries or private collectors.

Most Lithuanian iris cultivars belong to bearded irises. At this moment, 56 local cultivars are grown at Vilnius University Botanical Garden. There are a few groups of beardless irises that can be found in Vilnius Botanical Garden, for example *Spurias* (SPU). They look decorative all year long because of the attractive green foliage. Another group are *Siberians* irises (SIB) and their hybrids. Their grass-like foliage after bloom is one of their attractive garden features. In the category of bearded irises, there are a lot of tall bearded iris hybrids like 'Before the Storm' (Innerst, 1988), 'Stepping Out' (Schreiner, 1964), 'Thornbird' (Byers, 1988), 'Vibrations' (Dunn, 1989), 'Vanity' (Hager, 1974) and others.



'Fall Symphony' (Montanari, 2012) TB



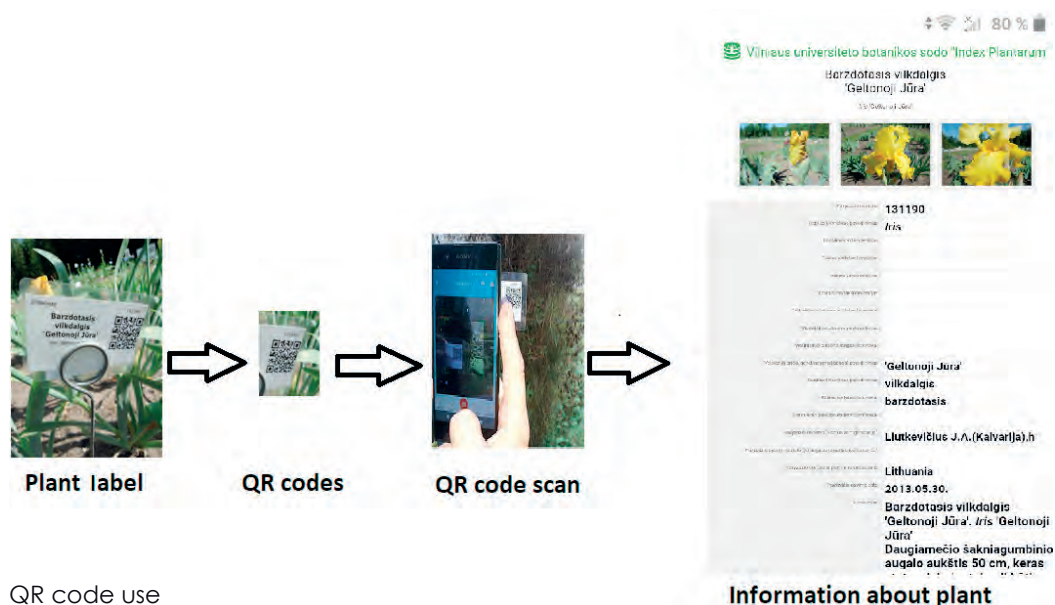
'Song of Norway' (Luihn, 1979) TB



'Nuclear Nancy' (Burseen, 2003) TB

Since the establishment of the Botanical Garden, we have grown at least 63 species of the *Iris* genus. The current collection includes indigenous species and natural varieties collected in their native localities or grown from seeds as well as cultivars and hybrids obtained by artificial crossings, gained in the forms of rhizomes or bulbs.

A database containing the information of all plant collections was developed in 2003. The database is partly open to the public (QR codes can be scanned) using the internet address: The database was very helpful for the unification of the plant registration system in the garden, for the development of the access system, for creating unified system of the accumulation of information on the plants growing in the garden.




QR code use



QR code for list of irises grown in Vilnius University Botanical Garden:

<http://www.botsodas.lt/indexplantarum>



In Lithuanian green areas, the use of QR is not yet widespread. It started as early as 2014 in the territories of the Vilnius University Botanical Garden. When used for educational purposes, the code is one of the simplest and convenient ways to provide various types of information about plants. It works really fast and today's youngsters enjoy it. In such a way, visitors are being directed to the webpage, where they can find all relevant information. In 2017, links to the garden assortment have been opened 3,000 times.

Lithuanian National Breeding Development of Irises

In the past, the iris collections of Lithuanian flower growers were not very large (in the number of species, varieties and hybrids). O. Griniuvienė and D. Žigarienė, E. J. Tarvidas, E. Tarvidienė, P. Balčikonis cultivated more than one hundred varieties of irises in their collections. S & N. Eicher – Lork family collected altogether 186 different *Iris* cultivars that grow well in Lithuania's climate.

Bearded irises are the largest group with the greatest number of cultivated varieties. They are also the most popular group of irises for garden use. The success of a breeder depends to a large extent on the knowledge of the available collection and working methods.

New cultivars of bearded irises have been developed by: P. Balčikonis, O. Griniuvienė, D. Žigarienė, J.E. Tarvidas, A. Gražys, G. Klimaitis, B. Kazelka, A. Markevičius, P. Puidokas, A. Liutkevičius, Ph.D. E. Dambrasukas, E. Kondratas. They are successfully performing an iris hybridization and also carry on the breeding of inter-species and cultivar hybrids of Siberian, Japanese and Spuria groups. The famous breeders A. Gražys and A. Markevičius are successfully developing new hybrids and cultivars of the Spuria group in Lithuania.

O. Griniuvienė (1921-2014) was one of the first iris breeders in Lithuania. She created more than eighty cultivars. Her daughter D. Žigarienė continues in hybridization work with the *Iris* genus. In 2010, four O. Griniuvienė bearded iris cultivars received Lithuanian national plant genetic resources status: 'Afrikietė' (1973), 'Karalienė Ayswaria' (2003), 'Nauja era' (unknown) and 'Rudenėlis' (1986).

The flower breeder P. Balčikonis started breeding irises around 1981. He created about 20 cultivars and unnamed seedlings. He accumulated a rich collection of different groups of irises. Three cultivars ('l'aisvė' (1997), 'Nida' (1989) and 'Danutė' (1997) were grown in the botanical garden, but they disappeared due to inadequate conditions. Some P. Balčikonio cultivars and hybrids can be found in other scientific institutions: VDU Kaunas Botanical Garden, the Lithuanian Institute of Horticulture.


J.A. Liutkevičius started breeding irises in 1990. He created about 50 named and unnamed hybrids of bearded irises. In 2010, twelve of his irises were granted Na-



'Šventaragis' (Liutkevičius, 2006) TB



'Geltonoji Jūra' (Liutkevičius, 2013) TB



tional plant genetic resource status (plant genetic resources, which have been selected and included in the central database of national plant genetic resources with ecological, selection and economic significance for the Republic of Lithuania) TB cultivars: 'Drakonas' (unknown), 'Šventaragis' (unknown); 'Jonas Biliūnas' (1996), 'Jovaras' (1999), 'Kerušis' (unknown), 'Krištolinis' (1999), 'Progresas' (unknown), 'Saulėtekis' (2006), 'Sietynas' (unknown), 'Sūduvis' (1999), 'Šaltinio Versmė' (unknown), 'Žydrius' (2006), 'Šventaragis' (unknown), some of them can be found in Vilnius University Botanical Garden.

D. Žigarienė began with iris breeding in 1975 and continues to this day. D. Žigarienė bred more than fifty cultivars of hybrid bearded irises. Eleven TB cultivars of irises were given National plant genetic resources status: 'Aivarėlis' (2003), 'Dalužė' (unknown), 'Feliksas' (1999), 'Juodis' (unknown), 'Ritos brolis' (1999), 'Rožytė' (unknown), 'Snaigė' (2003), 'Tėčio meilė' (unknown), 'Vaiva' (1998), 'Viliokė' (2001), 'Žiemos rytas' (1998). Three of them can be found in Vilnius University B.G.: 'Ritos Brolis' (1999), 'Žiemos Rytas' (1998) and 'Vaiva' (1998).

E. Dambrauskas gathered a huge collection of bulb flowers and cultivated Hermodactyloides, Juno, Xiphium irises and TB cultivars e.g. 'Apatūra' (1995), 'Lilac Giant' (unknown) among SDB e.g. 'Chingis Chan' (unknown), 'Feniksas' (unknown), 'Pigmy Boy' (unknown), 'Spragtukas' (unknown). In recent years, he has focused on Siberian iris collection.

E. Kondratas is known in Lithuania as the iris grower, collector and breeder of SIB cultivars and hybrids. E. Kondratas has been cultivating *I. sibirica* for 23 years. It takes 3-4 or even 10 years to hybridize SIB cultivars. When selecting newly received seedlings, E. Kondratas focuses on flower shape and color. He donated his seedlings to VMU Kaunas Botanical Garden. Cultivars created by E. Kondratas are registered in the USA and Great Britain. His cultivars have received international recognition: 'Adolf Svoboda' (2004), 'Juditos Angelas' (2009), 'Karalius Mindaugas' (1999), 'Karalienė Morta' (2004), 'Lithuania Amber' (1999) and others. He is a part of the Species Iris Group of North America (SIGNA) and the Society for Siberian Irises (SSI).

A. Gražys started cultivating irises 40 years ago. He was one of the first in Lithuania to start breeding small dwarf bearded irises. He has already created a few dozen SDB cultivars. For many years he cultivated, collected, and introduced cultivars and forms of *Iris ensata*, *I. pumila*, *I. spuria*. In recent years, he has engaged in the introduction of the latest cultivars of *I. foetidissima* and *Iris sibirica*. Three MDB irises have been given National plant genetic resource status: 'Algirdas' (2004), 'Juožapas' (unknown), 'Stanislava' (unknown). In 2006, A. Gražys donated all breeding material to Vilnius University Botanical Garden.



Adolf Svobora (Kondratas, 2004) SIB

J.E. Tarvidas and E. Tarvidienė were among the first to join the ranks of the **Lithuanian Flower Breeders' Society**. They carried out breeding work in the flower garden of the Lithuanian Institute of Agriculture. Thirty years ago, J.E. Tarvidas, E. Tarvidienė started to collect irises. Four of E. Tarvidienė and J.E. Tarvidas iris cultivars were given the Lithuania National plant genetic resource status: 'Radynys' (unknown), 'Senolis' (unknown), 'Sveikuolis' (unknown) and 'Švelnutis' (unknown).



'Sveikuoli' (E. J. Tarvydai, 2004) TB

G. Klimaitis is known as an iris and daylily collector and breeder. He works mostly with *Iris pumila* breeding. Great attention is paid to the number of flowers on a stalk, plant viability in adaptations to soil and to different climatic conditions in Lithuania, reproductive intensity, wintering and others requirements for newly created cultivars. He has cultivated several dozen promising seedlings, which are cultivar contenders: 'Amberis' (unknown), 'Krakatuskas' (unknown), 'Progresas' (unknown), 'Volis' (2002), 'Ūkas' (2000) and oth SDB 'Bevardis' (2007), 'Žydrius' (2003) and others.




'Kratukas' (Klimaitis, 2018) SDB

Iris development in Lithuania would not be possible without creating and using new and advanced plant varieties. The most valuable national iris cultivars should contain only high quality ones which are well-adapted to Lithuanian conditions. Listed below, you can see 10 of the most valuable national cultivars of iris selection in Lithuania. All of ten cultivars in 2010 were granted National plant genetic resource status in Lithuania.

Recommended Lithuanian Varieties of Irises

1. 'Afrikietė' (Grinuvienė, 1973) TB. Plants grow up to 72-81 cm and typically produces 2 – 4 flowers. Buds are green with dark edges, usually 9 cm long. The height of the flower is 9.5cm. It is a bitone, where standards and falls have a different shade of the same red-purple color, falls are in a darker shade. The beard is wide, orange with brown stripes in the middle. It has no smell. Suitable for flowers and bouquets.



2. 'Feliksas' (Griniuvienė, 1999) TB. Plants grow to 71.5 cm and typically produce 5-7 flowers. Buds are dark red-purple, usually 8 cm long. The height of the flower is 9 cm. Flowering lasts no longer than 8-10 days. Bitone – blend, where the standards and falls are a different shade of the same orange color, falls in a darker shade. Tepals edge roundly oval, smooth. The beard is wide and the same color as tepals, orange. It has a strong and pleasant smell. Found to be disease resistant.

3. 'Šventaragis' (Liutkevičius, unknown) TB. Plants grow to 80-90 cm and typically produce 5-7 flowers. Buds are greenish with violet edges, usually 9 cm long. The height of the flower is around 13 cm. Flowering lasts no longer than 8-10 days. Plicata, stitched margin colors on falls of a lighter color. The tepal edges of falls are violet. The standard consists of purple color. The beard is wide and yellow. It has a strong and pleasant smell.


4. 'Saulėtekis' (Liutkevičius, 2006) IB. Plants grow up to 63 cm, with sword-shaped linear leaves, typically produce up to 1-4 flowers. The color of the bud is violet, usually 9 cm long. The height of the flower is around 13 cm. Flowering lasts 11-14 days. Flower bicolor, variegata - yellow or near-yellow standards with darker purple falls. Narrow white beard with yellow tips. It has a strong smell.

5. 'Kerūžis' (Liutkevičius, unknown) IB. In general terms, plants grow to 54 cm, with sword-shaped linear leaves, typically produce up to 1-4 flowers. The buds are white, usually 8.5 cm long. The height of the flower is around 13 cm. Flowering lasts 11-14 days. The flower is self, standards and falls are the same white color. The beard is wide and yellow. It has a strong and pleasant smell. Can be used in various floristic compositions.

6. 'Progresas' (Liutkevičius, unknown) TB. Plants grow up to 80-90 cm. Typically produce 1-4 flowers. The buds are dark, usually 7.5 cm long. The height of the flower is around 11 cm. Flowering lasts no longer than 8-10 days. Flowers are bitone, standards and falls have different shades of the same violet color and falls are of a darker shade. The beard is wide and white with a yellow tip. It has a pleasant smell.

7. 'Stanislava' (Gražys, unknown) MDB. In general terms, plants grow to 12-23 cm, with sword-shaped linear leaves, typically produce up to 1-4 flowers. Buds are in a dark blue color, usually 7 cm long. Flowering lasts than 11-14 days. Flowers are small, neglecta (bitone color, in which the standards are light blue, and the falls are a dark blue - purple). Tepals lightning to the edges. They are elastic, silky, and roundly oval. Narrow beard, half of it is light blue, the other half yellow. It has a strong, but pleasant smell. Found to be disease resistant.

8. 'Sveikuolis' (Tarvidai, unknown) TB. Plants grow up to 80-90 cm, with linear leaves, typically produce up to 1-4 flowers. Buds are dark blue, usually 7-8 cm long. Flowering lasts 11-12 days. The standards are white, falls in purple, amoena type, the beard color is yellow, wide. It can be used in a floristic composition.



9. 'Ūkas' (Klimaitis, 2000) IB. In general terms, plants grow to 75 cm, with linear leaves, typically produces up to 5-7 flowers. The height of the flower is 10 cm. The buds are bluish-green, usually 9 cm. Flowering lasts 15-17 days. Flower is amoena, the standards are white with yellow, and the edges of the falls are purple. The beard color is yellow-white, wide. The cultivar has a strong and pleasant smell. Found to be disease resistant.

10. 'Vaiva' (Žigarienė, 1998) IB. Plants grow up to 68 cm, with linear leaves, typically produces up to 5-7 flowers. The buds are violet, usually 6.5 cm long. The height of the flower is around 10 cm. Flowering lasts 11-14 days. The flower is plicata, the beard color is yellow with an orange tip, wide. The cultivar has an unpleasant smell.



'Afrikiete' (Grinuvienė, 1973) TB



'Vaiva' (Žigarienė, 1998) IB



'Stanislava' (Gražys, 2014) MDB




'Progresas' (Liutkevičius, 2006) TB

Maintenance of the Iris Collection in Vilnius Botanical Garden

Climatic conditions


- Climate: humid continental (Köppen climate classification Dfb)
- Average annual temperature: 6,4°C
- Hardiness zone: 6a
- Average annual rainfall: around 655mm
- Altitude: 112m above sea level
- Soil types – generally sand to sandy loam, the area of the collection is located on turfy, gleyic, loamy, light loamy soil, pH 5,6



Basic garden Maintenance of Irises in the Vilnius University Botanical Garden

Although irises are easy to grow, it is important for the health of the plant to grow them correctly. The rhizomes need to be lightened by the sun to produce flowers in the following flowering season. When planting irises, it is important to make sure they are spaced so that neighbouring plants will not encroach on them. Many of the older cultivars thrive with partial shade and in climates where the summers are very hot, a partially shady site can be advantageous. The soil in all situations must be well drained. If it is wet, the rhizome will rot. In heavier soils, it should be dug in sand, grit, or matured compost before planting to allow the soil to drain. In very wet soils, particularly those that are wet during the winter or those that contain a lot of clay, plants should be grown on a well-drained slope or in a raised bed. The soil needs to be balanced and not too rich.

- Irises should be spaced at least 30 cm apart. Smaller cultivars can be placed as close as 23 cm apart. In Vilnius University Botanical Garden, the irises are planted in groups. An appropriate distance between plants was maintained. They can be placed in a circle or triangle with the non-foliage ends of the rhizomes pointing inwards, towards each other. This gives the plants an open central, so the sun can reach the rhizomes.
- The best time to plant an iris is just before the new roots start to grow. That is about six-seven weeks after flowering. Watering at planting time in Lithuania is not necessary.
- The rhizomes of replanted irises are usually planted up to 2.5 cm below soil level. Irises like sunny spots for this reason. They are planted in a place in the garden where they can get about six or more hours of sunlight a day. It is important to notice that the rhizomes of irises in Vilnius Botanical Garden are pointed to the south side. The rhizomes receive an inflow of direct sunlight in the heat season there.
- Plants are fertilized twice a year. First, fertilization takes place in spring about 6-8 weeks before blooming, when the plants are putting on new leaf growth. Fertilizers high in nitrogen don't do much for flowers and also lead to bulb rot. N-P-K (6-9-11). The second fertilization takes place after the plants have bloomed (6-8 weeks after), when new roots are being produced. The proportion of P-K is equal (9-11).
- Transplanting should be done at least every three to five years. Some cultivars, particularly smaller ones like the MDB or SDB, should be divided every two years. The failure to do so will lead to decreased blooming.
- Irises in mild and temperate areas do not need winter protection. In a colder climate, frosts can uproot the rhizomes; therefore, the iris should be protect-



ed. After the first year of transplanting, we cover them with spruce branches. Under circumstances of global warming, a change in the way we take care of irises in winter time is expected.

- Irises cultivated in Lithuania are most often affected by bacterial rot, bunch rot and leaf spot. To prevent disease, it is important to frequently remove diseased, dead or dying leaves. Snap off spent flower stems at the base. In the autumn iris foliage is cut into a pointed V shape. This is because old leaves may conceal fungal spores, snails and slugs during the winter. The V shape stops the plant from popping out of the ground in windy conditions. Because the disease can be transmitted via garden tools and water, we always disinfect tools with a 70% isopropyl alcohol.
- In Vilnius University Botanical Garden, pests very rarely cause damage to irises. In the event of properly followed maintenance rules, they are not even found often in large collections. When aphids are observed, the plants must be sprayed with insecticides, such as Fastac (active ingredient alpha-cypermethrin), Decis 2.5 EC (deltamethrin).



Iris care – cutting the leaves into a pointed V shape



Damaged iris foliage



'Shiryukyo' (Shimizu, 2008) SPEC-X (pseudata)

III. RECOMMENDED GARDEN CULTIVARS OF IRISES

TOP 30 RECOMMENDED IRIS CULTIVARS				IBOT	UWr	VU
Cultivar name	Category	Intr.	Breeder			
<i>Iris barbata</i> 'Alaskan Gold'	IB	1960	Mahood	x		x
<i>Iris barbata</i> 'Andalusian Blue'	IB	1937	Schreiner	x		x
<i>Iris barbata</i> 'Blue Pools'	SDB	1973	Jones	x		x
<i>Iris barbata</i> 'Bonnieblue'	IB	1928	Sturtevant	x		x
<i>Iris barbata</i> 'Bronzaire'	IB	1993	Bartlett	x		x
<i>Iris barbata</i> 'Conjuration'	TB (SA)	1988	Byers	x	x	
<i>Iris barbata</i> 'Deep Lavender'	SDB	1963	Welch	x		x
<i>Iris barbata</i> 'Dorothea'	IB	1901	Caparne	x		x
<i>Iris barbata</i> 'Dusky Challenger'	TB	1986	Schreiner	x	x	
<i>Iris barbata</i> 'Elsa Sass'	TB	1939	Sass	x		x
<i>Iris barbata</i> 'Emerald Rays'	SDB	1971	Dunbar	x		x
<i>Iris barbata</i> 'Fall Symphony'	TB	2012	Montanari	x		x
<i>Iris barbata</i> 'Gingerbread'	SDB	1969	Jones	x		x
<i>Iris barbata</i> 'Glow Girl'	IB	2012	Blyth	x		x
<i>Iris barbata</i> 'Grace Sturtevant'	TB	1926	Bliss	x		x
<i>Iris barbata</i> 'Her Majesty'	IB	1903	Perry	x		x
<i>Iris barbata</i> 'High Life'	TB	1964	Schreiner	x		x
<i>Iris barbata</i> 'Indian Pow Wow'	SDB	1972	Brown	x		x
<i>Iris barbata</i> 'Karibik'	TB	2011	Mego	x		x
<i>Iris barbata</i> 'Kupferhammer'	TB	1930	Arends	x	x	
<i>Iris barbata</i> 'Lent A. Williamson'	TB	1918	Williamson	x		x
<i>Iris barbata</i> 'Lohengrin'	TB	1910	Goos & Koenemann	x		x
<i>Iris barbata</i> 'Orinoco Flow'	BB	1989	Bartlett	x	x	
<i>Iris barbata</i> 'Pink Elf'	SDB	1994	Niswonger	x		x
<i>Iris barbata</i> 'Red Orchid'	IB	1934	Sass	x	x	
<i>Iris barbata</i> 'Sapphire Jewel'	SDB	1978	Hamblen	x	x	
<i>Iris barbata</i> 'Stepping Out'	TB	1964	Schreiner	x		x
<i>Iris barbata</i> 'Tomingo'	SDB	1969	Roberts	x		x
<i>Iris sibirica</i> 'Purple Merle'	SIB	1959	Hutchinson	x	x	x
<i>Iris versicolor</i> 'Kermensina'	VERS	1901	Perry		x	x



GARDEN'S CHOICES OF IRISES				IBOT	UWr	VU
Cultivar name	Category	Intr.	Breeder			
<i>Iris barbata</i> 'Karibik'	TB	2011	Mego	x		
<i>Iris barbata</i> 'Alaskan Gold'	TB	1960	Mahood	x		
<i>Iris barbata</i> 'Orinoco Flow'	BB	1989	Bartlett	x		
<i>Iris barbata</i> 'Deep Lavender'	SDB	1963	Welch	x		
<i>Iris barbata</i> 'Conjuration'	TB	1988	Byers		x	
<i>Iris versicolor</i> 'Kermensina'	VER	1901	Perry		x	
<i>Iris barbata</i> 'Kupferhammer'	TB	1930	Arends		x	
<i>Iris barbata</i> 'Red Orchid'	IB	1934	Sass		x	
<i>Iris barbata</i> 'Dusky Challenger'	TB	1986	Schreiner	x	x	
<i>Iris barbata</i> 'Song of Norway'	TB	1979	Luihn			x
<i>Iris barbata</i> 'Slovak Sapphire'	TB	2006	Mego			x
<i>Iris barbata</i> 'Fall Symphony'	TB	2012	Montanari			x
<i>Iris barbata</i> 'One Desire'	TB	1960	Shoop			x
<i>Iris barbata</i> 'Gold Anthem'	TB	1954	Douglas			x

Abbreviations:

IBOT – Průhonice Botanic Garden, Institute of Botany, Czech Academy of Sciences, Czech Republic

UWr – University of Wrocław Botanical Garden, Poland

VU – Vilnius University Botanical Garden, Lithuania

PdG – Park der Gärten, Germany

Intr. – Year of introduction



'Deep Lavender' (Welch, 1962) SDB



'Purple Mere' (Hutchison, 1959) SIB



'Grace Sturtevant' (Bliss, 1926) TB



'Tomingo' (Roberts, 1945) SDB



'Karibik' (Mego, 2010) – modern TB variety awarded by MEIS Carpathian Medal in Průhonice Trial Garden



IV. SUMMARY AND RECOMMENDATIONS FOR THE GARDEN MAINTENANCE OF IRISES

Summary and Recommendation

Irises are relatively easy garden plants to grow and will give good results with a minimum of care, but like all plants, the better the culture the more magnificent the display. It is extremely important to keep iris beds free of weeds and remove old dried fallen leaves, so the rhizomes may bask in the sun. Spacing the plants so there is good air circulation will help prevent diseases. Removing flower stalks as soon as the bloom season is over (this will help the iris to concentrate its energy in new growth production) is important. These short instructions are easy to implement and should lead to beautiful iris blooms year after year in your garden.



Ancient and historical irises in Průhonice Botanic Garden

BASIC MAINTENANCE OF IRISES	Průhonice BG	Wrocław University BG	Vilnius University BG
Is foliage cut after the blooming period?	NO	YES	Yes
Is dry foliage removed in autumn?	YES	YES	Yes
Is dry foliage removed in spring?	YES	YES	No
Do you hand-pick or cut flower stalks after blooming?	YES	YES	Yes
Do you transplant bearded irises?	YES	YES	Yes
How often? (3 or 5 or 7 years or other)	after 7 years	after 3 years	after 3 years
Do you transplant beardless irises? How often?	after 8 and more years	after 6 and more years	after 5 and more years
What kind of fertilizer do you use for bearded irises?	Ceririt NPK (MgO, S) 8-13-11 (2, 15) + B, Cu, Mo a Zn	Spring Yaramila NPK 9-12-25	SPRING NPK: 18-9-12 AUTUMN NPK: 5-15-20
What kind of fertilizer do you use for beardless irises?	Ceririt NPK (MgO, S) 8-13-11 (2, 15) + B, Cu, Mo, Zn	Spring Yaramila NPK 9-12-25	SPRING NPK: 18-9-12 AUTUMN NPK: 5-15-20.
Do you use organic fertilizer? What kind?	NO	NO	
What kind of (chemical) protection do you use against leaf blotch?	Dithane DG Neo - Tec	Amistar, Topsin	None
What kind of (chemical) protection do you use against iris rhizome rot?	Kuprikol, Dithane DG Neo - Tec	NO	No
How often do you use chemical protection and what kind for iris bud fly? (none, once a season, two times, more times).	Decis, Nurelle - two times	Mospitan - two times	None



References:

Austin C. (1957): *Iris: A gardener's encyclopedia*. ISBN: 0-88192-730-9.

Baltic Botanic Gardens (2019): 2015-2017 Estonia Latvia Lithuania. Periodical issue of the Rof Latvia. University of Latvia Press, Riga.

BIS (British Iris Society) (1997): *The Guide to Species Iris*. 1. Vydání publikované v Univerzitní tiskárně v Cambridge, Velká Británie. ISBN: 0-521-44074-2.

Blažek M. (1996): *Zahradnický slovník naučný*. Ústav zemědělských a potravinářských informací. Praha. ISBN: 80-85120-51-8.

Blažek M. (1968): *Iris*. - in Vaněk V. (ed.): *Mečíky a ostatní hlíznaté květiny*.

Blažek M. (1974): *Iridárium*. Zprávy botanické zahrady Průhonice 7-1974.

Buchanan R. & Holmes R. (1994): *Taylors Master Guide to Gardening*.

Cullen J., Knees S. & Cubey S. (2011): *The European Garden Flora Flowering Plants: A Manual for the Identification of Plants Cultivated in Europe, Both Out-Of-Doors and Under Glass*. Cambridge University Press.

Dainauskaitė D.J. (2019): *Lietuvių gėlės tėvynėje ir svetur*. I dalis, Vilnius.

Dykes W. (1974): *The Genus Iris*. Publikováno v U. S. A. Dover reedice originálně publikovala Cambridge University Press, 1913. ISBN: 0-486-23037-6.

Huml V. (1979): *Kosatce*. Pražská botanická zahrada v Troji.

Hultén E. & Fries M. (1986): *Atlas of north European plants north of the Tropic of Cancer*. Königstein: Koeltz Scientific Books.

Ioana C. & Cantor M. (2016): *New perspectives on medicinal properties and uses of IRIS SP*. Hop and Medicinal Plants, XXIV, No. 1-2.

Jaskonis J. (1989): *Aromatiniai augalai "Mokslas"*.

Kabała C. & Chodak T. (2002): *Środowisko – Gleby*, Informator o stanie środowiska Wrocławia 2002, Dolnośląska Fundacja Ekorozwoju, red.: Smolnicki K., Szykasiuk M, Wrocław .

Kaźmierczakowa R., Bloch-Orłowska J., Celka Z., Cwener A., Dajdok Z., Michalska-Hejduk D., Pawlikowski P., Szczeńniak E. & Ziarnek K. (2016): *Polska czerwona*



lista paprotników i roślin kwiatowych. Polish red list of pteridophytes and flowering plants. Instytut Ochrony Przyrody Polskiej Akademii Nauk, Kraków.

Kazlauskaitė S. Želdinių apsauga. Mokomoji knyga. Akademija. Dubicki A., Dubicka M. & Szymanowski M. (2002): Klimat Wrocławia. Środowisko Wrocławia – Informator, Dolnośląska Fundacja Ekorozwoju, Wrocław. Hellwig Z. 1957. Byliny w parku i ogrodzie. Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa.

Kącki Z., Dajdok Z. & Szczeńniak E. (2003): Czerwona lista roślin naczyniowych Dolnego Śląska. Kącki Z. (red.), Zagrożone gatunki flory naczyniowej Dolnego Śląska. – Instytut Biologii Roślin UWr, Polskie Towarzystwo Przyjaciół.

Komarnicki L. (2014): Irysy bezbródkowe. Wyd. RS DRUK, Rzeszów ISBN: 978-83-63666-42-2.

Komarnicki L. (2016): *Piękno Irysów*. Arboretum i Zakład Fizjografii w Bolestraszytach. ISBN: 978-83-65293-11-4.

Kotowski A., Danczewicz A. & Kaźmierczak B. (2010): „Czasowo-przestrzenne zróżnicowanie opadów atmosferycznych we Wrocławiu” *Ochrona Środowiska*, rocznik 2010, nr 4.

Kovačić S. (2019): Plethora of plants - collections of the botanical garden, faculty of science, university of zagreb (3): Iris (Iridaceae) collection, *Natura Croatica* 28(2).

Kralka M. (2018): Polskie irysy i ich hodowcy. Middle European Iris Society „IRIS”. Bulletin, ISBN 978-83-946895-0-6.

Łabanowski G., Orlikowski L., Skrzypczak Cz., Soika G. & Wojdyła A. (2005): *Ochrona bylin*. Plantpress, Sp. z o. o. Kraków ISBN 83-89874-27-X.

Marcinkowski J. (1991): *Byliny ogrodowe*. Państwowe Wydawnictwo Rolnicze i Leśne, Warszaw. ISBN 83-09-01422-8. Marcinkowski J. 2009. Królowe ogrodów kosaćce. „działkowiec” Sp. z o. o. Warszawa s. 73 ISBN 978-83-89615-57-2.

Lučinskienė A. (1986): *Daugiametės gėlės*. Vilnius “Mokslas”.

McEwen C. (1996): *The Siberian Iris*. Wyd. Timber Press, Incorporated; 1st edition. ISBN: 0-8819-2329-X.

Mikaliūnaitė R. (2005): *Vilkdalgijų (Iris L.) rūšių introdukacijos galimybės Šiaulių universiteto Botanikos sodo sistematikume // Dekoratyviųjų sodo augalų sortimento technologijų ir aplinkos optimizavimas*. Respublikinis mokslinės konferencijos straipsnių rinkinys. Mastaičiai.

Mikaliūnaitė R. & Jarmalavičiūtė G. (2009): *Vilkdalgijų žydėjimo tarpsnio įvertinimas Šiaulių universiteto botanikos sode ir šios genties augalų paplitimas Šiaulių mieste*



gėlynuose. Miestų želdynų formavimas.

Nowak T. J. & Grzeszczak-Nowak H. (2018): Katalog 1000 Polskich Odmian Roślin. ISBN 978-83-938338-4-9.

Oheimb F. (1920): Japanische Schwertlilien. Art. Archiwalny.

Opatrná M. (1983): Výzkum světových sortimentů *Iris sibirica*. Acta Průhoniana 46, VÚKOZ Průhonice.

Piękoś-Mirkowa H. (2014): *Iris graminea* L. Kosaciec trawolistny. [In:] R. Kaźmierczakowa, K. Zarzycki, Z. Mirek. (2014): Polish red data book of plants. Pteridophytes and flowering plants. PAN. Kraków.

Praca zbiorowa pod kierownictwem Zbigniewa Lewickiego LEMITOR Ochrona Środowiska Sp. z o. o. we Wrocławiu, „Środowisko Wrocławia”, Informator 2014, załącznik część D, Wrocław 2014.

Praca zbiorowa pod red. Filipczak J., Katalog roślin, drzewa, krzewy, byliny”, Związek Szkółkarzy polskich, Warszawa 2011, Przyrody „pro Natura”, Wrocław.

Rina Kamenetsky & Hiroshi Okubo (2012): “Iridaceae” Ornamental Geophytes: From Basic Science to Sustainable Production. CRC Press ISBN 978-1-4398-4924-8.

Samborski M. & Wejner K., „Geografia Polski”, Warszawa.

Sekerka P., Blažek M., Blažková U., Caspers Z., Macháčková M., Žlebčík J. & Polešný V. (2013): Průvodce po sbírkách Průhonické botanické zahrady na Chotobuzi. Botanický ústav AV ČR. Průhonice. ISBN 978-80-86188-40-9.

Stebbins G. (1997): The Gardener's Guide to Growing Irises. ISBN 0-7153-0229-9.


Tang S., Okashah R. A., Cordonnier-Pratt M.-M., Pratt L., Johnson V. E., Taylor Ch. A., Arnold M. L. & Knapp S. J. (2009): EST and EST-SSR marker resources for *Iris*. BMC Plant Biology volume 9, Article number: 72.

Umberto C. & Eidimtienė V. (2017): Experience and Sociocultural Aspects of Using QR code in Green Areas, Miestų želdynų formavima 1(14).

Vaclovas J., Vaidelys J., Makūnas V. & Prakapaitė G. (1997): Gėlininkystė. Daugiametės gėlės. Vilnius: L-la «Margi raštai».

Waddick J.W. & Yu-Tang Z. (1992): *Iris of China*. Wyd. Timber Press, Incorporated. ISBN 0-88192-207-2.

Wojciechowicz-żytko E., Rogowska B., Dobińska M., Witek A. & Kulig M. (2016): Insect pests occurring on the different *Iris* l. (Iridaceae) taxa. Acta Horticulturae et Regiolecturae.



Zajac A. & Zajac M. (Eds.) (2001):. Atlas rozmieszczenia roślin naczyniowych w Polsce. - Distribution Atlas of Vascular Plants in Poland. Nakładem Pracowni Chronologii Komputerowej Instytutu Botaniki UJ, Kraków s. XII + 716.

Žumbakienė G. (2016): Senieji Lietuvos gėlių darželiai. Lietuvos liaudies buities muziejus.

Kazlauskaitė S. Želdinių apsauga. Mokomoji knyga. Akademija.

Internet Resources

Gesellschaft der Staudenfreunde - Fachgruppe Iris (2020). <http://www.gds-iris-fachgruppe.homepage.t-online.de/>

Gladiris (2020). <http://www.gladiris.cz/>

Historic Iris Society (2020). <https://www.historiciris.org/>

<http://www.iris-uman.in.ua/assets/files/articles/irishistory.pdf>

Karpenko V.: Introduction history of species and varieties of genus Iris L. in the Ukraine against the background of global trend (2019).

Lithuanian Plants Genes Bank (2020). http://www.agb.lt/duomenu%20baze/dekor_augalai.php?page=4

Middle-European Iris Society (2019). <http://www.euroiris.net/>

The American Iris Society, Iris Encyclopedia. (2019). <https://wiki.irises.org/Main/WebHome>

Vilnius University Botanical Garden database (2019). <http://www.botsodas.lt/ind-explantarum>

Wikipedia (2020). [https://en.wikipedia.org/wiki/Iris_\(plant\)](https://en.wikipedia.org/wiki/Iris_(plant))



IRIS BOOKLET IN CZECH:

<http://www.ibotky.cz/en/clanky/erasmus/283-b-ardent.html>



IRIS BOOKLET IN POLISH:

<http://arboretumwojslawice.pl/projekt/>



IRIS BOOKLET IN LITHUANIAN:

<https://www.botanikos-sodas.vu.lt/news/322/42/Botanikos-sodai-kaip-dalis-Europos-kult%C5%ABrinio-paveldo>



IRIS BOOKLET IN GERMAN:

<http://www.park-der-gaerten.de/bildung/erasmus-b-ardent.html>



Participating Gardens:

Arboretum Wojstawice. <https://www.arboretumWojstawice.pl>

Park der Gärten. <https://www.park-der-gaerten.de>

Průhonice Botanic Garden. <https://www.ibotky.cz>

University of Wrocław Botanical Garden. <https://www.ogrodbotaniczny.wroclaw.pl>

Vilnius University Botanical Garden. <https://www.botanikos-sodas.vu.lt>

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