EUROPEAN collaboration for NATIVE ORCHID conservation

EGER 1774

ESZTERHÁZY KÁROLY
UNIVERSITY OF APPLIED SCIENCES

PLANTA·EUROPA

PLANTA EUROPA
WILD ORCHID CONSERVATION

In June 2015 a five day conservation workshop was held at Eszterházy Károly College in the historic town, Eger in Northern Hungary with the aim of exchanging information through a series of lectures by invited speakers and discussing practical ways of conserving endangered orchid species.

The workshop included a field trip to see the iconic Cypripedium calceolus in flower in an area of special interest protected by the expert people of conservation of Bükk National Park in the nearby Bükk Mountains (see the pictures). This area also home to an additional 15 orchid species. Long-term studies had revealed that, despite active management of the site, the populations of C. calceolus were continuing to decline. Only 35 populations of these long-lived plants now remain in Hungary and, of these, only 9 may be considered to be stable according to the data of József Sulyok, the Head of Biolodiversity departmrent of the Bükk National Park Directory. It appears that the reduction in numbers is most likely due to the long-term effects of climate change and increasingly frequent extended droughts early in the year, leading to the death of vulnerable seedlings. After the workshop during the field trip to Kiskunság National Park areas the participants had the possibility to visit wet orchid meadows in the Great Plain of the Pannonian region near Fülöpszállás (see the pictures). 10 orchid species occur in the wet areas, most of the were in flower and seemed to have stable populations except for Cephalanthera longifolia, two individuals can be detected near Kolon lake with little seed production and they would like to support it with hand pollination.

It is a promising process that orchid micropropagation labs around the world are developing techniques for the in vitro propagation of a wide range of endangered species. Workshop participants learned about the practicality of long-term seed storage and had the opportunity to try symbiotic germination techniques for themselves in the college facilities. The Department of Botany and Ecology with the Botanical Garden of Eszterházy Károly University of Applied Sciences in Eger is currently exploring the possibility of setting up its own orchid seed bank in partnership with Orchid Seed Science and Sustainable Use (OSSSU), using the expertise of colleagues at Füvészkert Botanical Garden of Eötvös Loránd University in Budapest.

Erika Pénzesné Kónya PhD
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THE OWNER OF THE IDEA - PHILIP SEATON

After teaching biology in a small college, Phil's passion for orchids and their conservation began whilst teaching, and he has been an amateur grower for more than 30 years. He was awarded a Winston Churchill Memorial Fellowship in 2000 to travel to Cuba, Mexico, Costa Rica and Ecuador to study the ex situ conservation of orchids.. He is a frequent speaker at international orchid conferences. He is a past editor of the Orchid Review, and is a regular contributor to popular orchid publications, writing on a wide range of orchid related topics. Phil is a past winner of the American Orchid Society Dillon/Peterson Memorial Essay Competition for Pest Control: My Way. Together with Margaret Ramsay, Head of the Micropropagation Unit at Kew, he is co-author of Growing Orchids from Seed, published by the Royal Botanic Gardens, Kew.

Having determined that the dry seeds of many species have the potential to survive for many years when maintained at low temperatures, the opportunity to turn theory into practice came about when, in 2007, He was appointed project manager of the UK Darwin Initiative project, Orchid Seed Stores for Sustainable Use (OSSSU) with the aim of establishing a global network of orchid seed banks. OSSSU currently has partners in 27 countries around the globe who, in addition to storing seed, are generating valuable scientific data on a range of related issues. Having reached retirement age, he is continuing his work with OSSSUas an Honorary Research Associate of Kew. He is a Trustee of Orchid Conservation International and a member of the IUCN Orchid Specialist Group.

SUPPORTING PLANTA EUROPA MEMBER - JULIA JONES

She is an English writer and artist who has made a home on the Greek island of Crete. From the beginning she was fascinated by the wonderful flora to be found there, but over the years her focus has turned to the endangered endemic orchid, Himantoglossum samariense in particular. She is now working with Phil Seaton to propagate this orchid from seed and to collect and save seed to various seed banks around the world.

Over the years she has built up a collection of watercolour paintings of Cretan endemics, which have been exhibited in Greece and the UK and she has been a keynote speaker at Conferences on Environmental Issues around Crete.

ASYMBIOTIC PROPAGATION OF HARDY ORCHIDS AT THE ELTE BOTANICAL GARDEN – REVIEW OF THE WORK DURING THE PERIOD 1988-2012

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KEYWORDS: ASYMBIOTIC PROPAGATION, HARDY ORCHID, NATURAL COMPLEX ADDITIVES

The laboratory of the ELTE Botanical Garden started to work in 1986 and our primary aim was the asymbiotic micropropagation of tropical orchids so to increase the collection of Botanical Garden and to preserve several rare and endangered species (R. Eszéki, Szendrák 1999).

We have started to focus on the propagation from seeds of hardy orchids since 1988. Our primary goal was to find the optimal culture media composition for asymbiotic germination of temperate hardy orchids. In the case of 19 native Hungarian species the most successful among the examined media was a modified Fast medium (Fast, 1982) for both germination and for subsequent subcultures (R. Eszéki, Szendrák 1992; Szendrák, R. Eszéki 1993; Szendrak 1997).
During the period 1990 to 1997 we observed and monitored the germination and the 'in vitro' cultivation of 20 different temperate orchid species. The shortest germination time was 29 days in the case of Anacamptis morio (L.) R.M.Bat., Pridg. & M.V.C and the longest period was 410 day in the case of Cypripedium californicum A.Gray.

We examined the influences of the polyphenol formation factors and how these negative tendencies could modify the shoots and roots development of Anacamptis palustris subsp. palustris (J.) Bat., Prid.. & C., Dactylorhiza majalis (Rchb.) P. F.Hunt & Sum. and Dactylorhiza maculata (L.) Soó species and protocorms of Epipactis helleborine (L.) Crantz on five different media. The browning of the medium decreased on lower temperature (15-18 0C) and under natural illumination (R. Eszéki, Szendrák 1992; R. Eszéki 2005). The positive effect of applying potato cubes as plant origin natural complex additives directed our attention to extend the studies to this direction. Experiments were carried out with the native Dactylorhiza maculata (L.) Soó protocorms and shoots. Fast (1982) medium was supplemented with 10 g/l potato starch, 5 g/flask fresh potato, 5 g/flask storing potato and 25 g/l potato flakes.

Results proved that potato products were suitable growth promoters on the protocorm and shoot growth of Dactylorhiza maculata (L.) Soó comparing to the control Fast medium (R. Eszéki, Tilly-Mándy, Forrai 2009).

Based on the examinations during 2004-2007, we identified the culture medium for the in vitro culture of Liparis loeseli (L.) Rich sterile stock. The FMB medium (FM + 10 g dried potato / 1200 ml d. w.) gave the best response (Illyés, 2003; R. Eszéki, 2012).
During six years (2006-2012) we got a definite result when we compared the number of effective seed sowing (24) with the total number (81) in the case of temperate orchids' species, on the base of the source of supplies. The lowest ratio was 10 % in the case of seeds (43) originated from different Botanical Gardens /Index Seminum/, and in the other three case the average was 50 % (R. Eszéki, 2012).
During these decades we have also several experiments for acclimatization. Anacamptis morio (L.) Bat., Prid. & C. which was transferred in 1991 and repeatedly in 1994 and have survived for several years after the acclimatization in vivo (R: Eszéki and Szendrák 1992; Szendrak, 1997). In the case of the transfers between 1995 and 2011 for Dactylorhiza maculata (L.) Soó, Anacamptis morio (L.) R.M.Bat., Pridg. & M.V.C., Anacamptis palustris (Jacq.) R.M.Bateman, Pridgeon & M.W.Chase (ssp palustris), Liparis loeselii (L.) Rich and Platanthera bifolia (L.) Rich species, the plantlets have survived two years after the acclimatization (R. Eszéki, Szendrák 1992).

Successful cultivation has gone under ex situ circumstances of Liparis loeselii (L.) Rich seedlings derived from in vitro since 2012 February. The relationships of the bulb size, thus the bulbs only after certain development (5-8 mm x 5-10 mm) can be able to develop two leaves (48 %) and flower (13 %), should promote the protocols for successful recovery (R. Eszéki, 2012).

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CRETE'S ENDEMIC ORCHIDS AND OPHRYS

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KEYWORDS:
CRETE, ORCHIDS, OPHRYS, HIMANTOGLOSSUM SAMARIENSE, ENDEMIC, ENDANGERED

The Greek island of Crete is famous for its wealth of flora and, in particular, its rich and diverse orchids and ophrys. Of the 67 species that have been recorded 14 are classified as endemic. This number is constantly changing as species are re-classified and new variations are recognised as sub-species. However, it is my intention to focus on the currently classified endemic species and, in particular those considered rare and/or endangered in the Greek Red Book; the only exception being the extremely rare and threatened Himantoglossum samariense.

PLANT CONSERVATION IN THE IN VITRO COLLECTION OF O.V.FOMIN BOTANICAL GARDEN OF TARAS SHEVCHENKO KYIV NATIONAL UNIVERSITY

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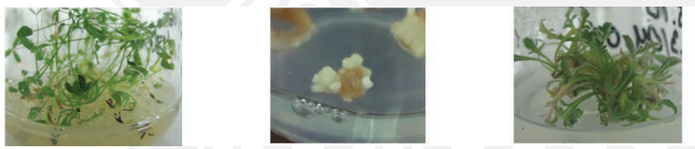
The creation of plant collections in botanical gardens is one of the most effective way of preserving them ex situ. Besides traditional collections on open ground and collections of tropical and subtropical plants in greenhouses, in vitro collections also gain popularity.

The plant biotechnology laboratory of Fomin botanical garden was created more than 30 years. Main task of the laboratory during this time has been the introduction into aseptic culture and in vitro plant multiplication, which cannot be propagated by ordinary means due to physiological peculiarities or limited cultivation material amounts. These plants are mostly rare, medical, decorative species that were deposited to the collections of the botanical garden.

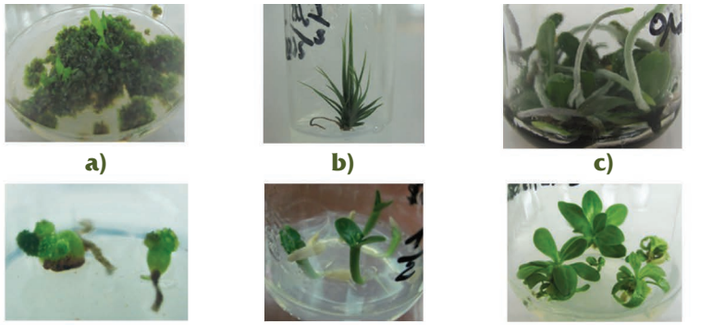
The creation of in vitro collection, as an experimental database for introduction, research of morphogenic features and propagation of important plants using a minimal quantity of parental specimens which is really important in the introduction in a culture of rare plants has proven to be essential for saving the gene pool of introduced plants. Today, in the laboratory of plant biotechnology of the botanical garden more than 50 species of plants are cultivated, which have been brought into culture within the last 3 years. The priority is given to the rare and disappearing plants from Ukraine and all over the world. At this time, our laboratory researches the morphogenesis and clonal micromultiplication peculiarities of 9 rare Ukrainian flora species of the following genera: Asplenium, Gentiana (3 species), Astragalus, Centaurea, Galanthus, Pinguicula, Atocion (Fig. 1). Among the introducted to in vitro culture plants there are species which have rare or disappearing status as well in Ukraine, as outside of it.



a) b) c)

Fig. 1. Rare and disappearing plants of Ukraine in the O.V. Fomin Botanical Garden of Taras Shevchenko National University of Kyiv in vitro collection:
a) Astragalus cretophilus; b) Galanthus plicatus; c) C. cf. sterilis.

The collection includes 26 tropical and subtropical plant species and varieties: fern - Nephrolepis, Platicerium, Pyrrosia, Drynaria and Microsorum genera; bromeliad - Tillandsia, Guzmania, Vriesea; orchids - Phalaenopsis, Bletilla, Zygopetalum, succulent plants - Mammillaria, Aylostera, Parodia, Setiechinopsis, Melocactus, Adenium, Pachypodium; also Begonia, Eustoma (Fig. 2).



a) b) c)
d) e) f)

Fig. 2. Tropical and subtropical plans in the in vitro collection of O.V. Fomin Botanical Garden of Taras Shevchenko National University of Kyiv: a) Pyrrosia longifolia cv.; b) Tillandsia pruinosa; c) Phalaenopsis sp.; d) Aylostera fiebrigii; e) Pachypodium lamerei; f) Eustoma grandiflora.

There are also more than 20 species of medical and decorative plants, included in the collection, such as: Gentiana, Heuchera, Tiarella, Tellima, Hosta, Asparagus, Bergenia, Acorus, Mellitis) (Fig.3).

a) b) c)

Fig. 3. Medical and decorative plants of Ukraine in the O.V. Fomin Botanical Garden of Taras Shevchenko National University of Kyiv in vitro collection: a) Heuchera 'Caramel'; b) Hosta 'Patriot'; c) Mellitis melissifolium

During the process of in vitro introduction, as the source material, vegetative plant parts, seeds or spores are used. Thus, the raw cultivational material for Eustoma, Heuchera, Mammillaria, Begonia were the leaves, for Astragalus - young sprouts, Nephrolepis - aboveground stolons, Galanthus - bulb parts, Asplenium, Platicerium, Pyrrosia, Drynaria - spores, multiple other plants - seeds. For every species introduced this way it is elaborated an optimized nutrient medium, depending on the plants needs and on the expected morphogenic reactions. The most commonly used is the Murashige-Skoog modified medium. The developed mass clonal plant micromultiplication technologies allow for acquisition of enough experimental material for further physiological investigation, plant adaptation to soil conditions and specialized collection replenishment in our botanical garden.

The creation and preservation of the collections of plants in conditions of aseptic culture helps to solve several problems: preservation of rare plants, acquisition of plant material for restoration of natural populations using the method of reintroduction, acquisition of needed quantity of pharmaceutical raw materials without using the plants of natural population and, besides that, acquisition of decorative planting materials in order to use them in landscaping.

THE IMPORTANCE OF RANGE-MARGIN POPULATION MONITORING IN SELECTED ORCHID SPECIES – A CASE STUDY FROM SOUTHERN POLAND

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In Poland, from the point of view of nature conservation, species of the Orchidaceae family are among the most valuable native flora elements and all of them are protected by law - 43 strictly protected and 9 partially protected. In addition, as many as 35 of them have been considered as threatened (Zarzycki & Szeląg 2006). However only two of the species of orchids occurring in Poland, i.e. Cypripedium calceolus and Liparis loeselii are of the European Union importance (Habitats Directive). An investigation of the level of threat to vascular plants in the Silesian Upland (a physical-geographical macro-region in southern Poland) has been carried out. Special attention was paid to the species mentioned above, as well as two others - Malaxis monophyllos and Gymnadenia conopsea subsp. densiflora. Localities of these orchids in the Silesian Upland are often situated at the edge of the range of the species in Poland. It is well known that within such populations specific processes are observed (Ladle & Whitaker 2011). For this reason, monitoring providing information on all changes and the direction of change is very important. Monitoring is therefore one of the main tools that helps suggest the appropriate steps to be taken for the effective protection of the species. The paper presents results of an analysis of available data concerning occurrence (number of localities, distribution patterns), resources and habitat preferences collected over the last 20 years for these four species. Based on these data the degree of threat at the subregional level has been determined. Furthermore, conclusions concerning the protection of these species are presented.

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ORCHIDS, KEW AND ORCHID SEED STORES FOR SUSTAINABLE USE

PHILIP SEATON

The Royal Botanic Gardens, Kew, has a global reputation for excellence for research on plant biodiversity. The Herbarium houses more than seven million specimens, including approximately 350,000 type specimens. Specimens are stored as pressed and dried plants and, where necessary, as spirit collections. Almost 40,000 orchids are found within the Orchid Herbarium. Remarkably perhaps, even today new species of orchids are still regularly still being discovered. Molecular techniques have revolutionised plant taxonomics and the understanding of plant evolution. Kew staff are world-leaders in this field. Extensive living collections of orchids provide a resource for conservation and further research. The Conservation Science department is currently undertaking a project in Madagascar to isolate and identify orchid mycorrhizal fungi.

Many orchid species are at risk of extinction in their natural habitats and Kew has played a key role in identifying and Red Listing some these species. The slipper orchids (Cypripedium and Paphiopedilum) are currently of particular concern. Whereas many European species in general may not be of immediate concern, others are in urgent need of conservation action. A number of international agreements have been put in place, but what is required is action. One of the Kew's flagship projects for orchid conservation is Orchid Seed Stores for Sustainable Use (OSSSU). Originally a UK Darwin Initiative project, running from 2007 to 2010 an original network of 16 participating countries has grown into the current 27 countries. The original 16 countries jointly agreed a series of protocols for seed storage and regular germination testing together with the gathering and sharing of scientific data through a password protected section in the OSSSU web site. Although wild collection of seeds (with the appropriate permissions) is to be encouraged where appropriate, living collections underpin the project. Education, training and the sharing of experience are key to the success of the project and the OSSSU web site is currently undergoing an update to enable members of the network to upload their own information making it available to a wide audience. The range of accessible protocols will include guides to pollination, both symbiotic and asymbiotic germination techniques and viability staining. Stored seed has been successfully employed for reintroduction projects of both epiphytic (Singapore Botanic Gardens, Cali Orchid Association and Atlanta Botanical Garden) and terrestrial (Atlanta Botanical Garden) orchid species.

SUMMARY OF THE RESULTS OF PANNON SEEDBANK PROJECT WITH PARTICULAR REGARD TO THE CONSERVATION OF ORCHID SPECIES

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The main goal of five years long (2010-2014) Pannon Seedbank project was collecting and long-term ex situ preservation of at least 800 wild vascular native plant species of Pannon biogeographical region which are suitable for storing.
The project not only achieved the planned goals, but also exceeded them by collecting and storing of 1853 accessions of 910 species. 364 accessions of 204 different protected species were collected, and 76 accessions belong to 45 strictly protected species. In Pannon Seedbank laboratory seeds were cleaned to decrease bulk, reduce disease risk, and facilitate future use. Viability of all accessions was tested following ISTA recommendations or based on on-line database of Royal Botanic Gardens, Kew. Best germination results were achieved in the case of Bromus inermis (92,8 %), Verbascum phoeniceum (88,3 %), Rumex crispus (86,0 %), Melica transsilvanica (85,4 %) Podospermum canum (85,0 %) and Gypsophila paniculata (83,3 %).

Currently our collection includes 65 accessions of 31 Orchideaceae species, 7 species with 15 accessions are strictly protected, and others are also protected. Geographical coverage of these accessions is wide; these were collected from 34 different Hungarian micro-regions between 2011-2014. Seeds were harvested when the capsules were ripen.

During the project 38 accessions of 26 different orchid species were investigated. Routine testing of orchid seed quality is rather more complicated than for other groups of species, because the seeds are very small and light and produced in great numbers. Orchid seeds were sown on sterile medium (modified FAST) in laminar hood according to the recommendations of ELTE Botanical Garden under 15 °C and continues light conditions. The process took several months, without positive results. Further investigations are planned with tetrazolium test.
Similarly to the other wild plant species seeds of orchids are also stored after drying in hermetically sealed aluminium foil bags in active (0 °C) and base (-20 °C) cabinets. According to literature data orchid seeds are not harmed by low temperatures; typical storage at 4 °C is fine and at -20 °C may even allow them to be stored longer.

ORCHID SPECIES AND THEIR CONSERVATION IN THE BOTANICAL GARDEN OF EKU

The botanical garden belongs to Eszterházy Károly University in Eger The professional management for the plant growing activities is provided by the College's Department of Botany.

The garden is situated on Almagyar-domb, with an area of 9526 m2. The botanical garden is under local protection, that the living collection certainly deserves, as it contains more than 600 plant species, mainly the flora of the Carpathian basin can be found there. The part of the collection is located in the Lajos Juhász Greenhouse (EK College, Leányka út, G-building), which is home of tropical and subtropical plants. The most important task of the botanical garden is plant preservation, propagation and possible reintroduction to their original wild habitat, as one of the conservation strategy method of endangered species. The other main aim of the garden is to exhibit plants and it has a great educational character as well. The garden provides a location for biology training lessons, and also creates opportunities for botanical and ecological researches.

The largest part of the garden's woody vegetation is devoted to the presentation of the Northern Hungarian Mountains (particularly the Mátra and Bükk Mts.). This vegetation belongs to Carpathian flora. The geological substrate of the mountains is very diverse. We would like to present specially features from the Bükk Mts. It's flora includes beech montane and ravine forests on calcareous bedrocks. The lower hills and southern hillsides are covered by oak hornbeam and turkey oak forests. In the forests undergrowth can be found some rare and endemic species like alpine rock-cress (Arabis alpina), victory onion (Allium victorialis), hellebore (Helleborus purpurascens), perennial honesty (Lunaria rediviva), european monkshood (Aconitum variegatum) and Vrabélyi's-violet (Hesperis matronalis ssp. vrabelyiana). The flora of Mátra's extreme rocky habitats is exhibited in the andesit rock-garden, where succulent species can be found like houseleek (Sempervivum sp.), stonecrop (Sedum sp.) or Schudich's pennycress (Thlaspi kovatsii ssp. schudichii), tall thrift (Armeria elongata) and the showy mountain cornflower (Centaurea montana). The Southern Transdanubia floristic area, the transition between the Pannonian and the Western Balkan regions, covers the Mecsek and Villány Hills and the Somogy and Zala Hills. The vegetation has a very strong sub-Mediterranean character with some balkan floristic elements such as silver lime (Tilia argentea), small hellebore (Helleborus dumetorum) and daylily (Hemerocallis lilio-asphodelus). At the same time, one can also find sub-Atlantic species like liverleaf (Hepatica nobilis).

The forest-steppe vegetation of Hungary is mosaic and variable, consisting of species-rich plant associations: steppes on warm southern slopes and along edges of sessile oak woods or subcontinental loess steppes within the Great Hungarian Plain. Among the shrubs should be mentioned, for example dwarf russian almond (Amygdalus nana), european cornel (Cornus mas), red-rose-of-lancaster (Rosa gallica), burnet rose (Rosa spinosissima), smoke bush (Cotinus coggygria), wayfaring-tree (Viburnum lantana) and bladdersenna (Colutea arborescens). Typical trees are tatarian maple (Acer tataricum) and downy oak (Quercus pubescens).

The herbaceous vegetation is dominated by cluster-growing grasses like the fescue (Festuca spp.) and needlegrass (Stipa spp.) species. The forest-steppe vegetation on slopes is associated with stands of false japanese bromegrass (Brachypodium pinnatum) or upright brome (Bromus erectus). Visitors will encounter showy flowering plants which occur on steppe habitats: spring pheasant's eye (Adonis vernalis), greater pasque flower (Pulsatilla grandis), tuberous Jerusalem sage (Phlomis tuberosa), european Michaelmas-daisy (Aster amellus), alpine clover (Trifolium alpinum), carnation (Dianthus pontederae) and woodland sage (Salvia nemorosa).

The botanical garden also exhibit exotic plants not native to Hungary but often planted in the country's parks and gardens. Some examples of ornamental trees and shrubs include: common honeylocust (Gleditsia triacanthos), red oak (Quercus rubra), turkish hazel (Corylus colurna), black walnut (Juglans nigra), white mulberry (Morus alba), ginkgo (Ginkgo biloba), rhododendron (Rhododendron spp.), magnolia (Magnolia kobus) and staghorn sumac (Rhus typhina).

The floristic region of Western Hungary is situated in the coolest part of the garden. It represents mainly the foothills of the Alps (Soproni and Kőszegi Mts., the Vas surroundings and Őrség). Here visitors will find lot of dealpin and montane plant species descended from the Alps, such as austrian leopard's bane (Doronicum austriacum), valley lily (Maianthemum bifolium), goat's beard (Aruncus sylvestris) and european

cyclamen (Cyclamen purpurascens). The vegetation is characterized by the presence of conifer tree stands and peatmoss-bogs (Sphagnum). On acidic soils grow bilberry (Vaccinium myrtillus) and lingonberry (Vaccinium vitis-idaea) and alder buckthorn (Frangula alnus). Here, too, can be found a botanical garden speciality: atlantic cedar (Cedrus atlantica).

In the garden's wetlands and marsh vegetation there are well-known species such as marsh-marigold (Caltha palustris), pestilence wort (Petasites hybridus), forget-menot (Myosotis scorpioides) and siberian iris (Iris sibirica), along with some rare species as well: tussock cottongrass (Eriophorum vaginata), marsh cranesbill (Geranium palustre), spotted loosestrife (Lysimachia punctata), common bistort (Persicaria bistorta) and others.

Above the garden's marsh, on a small open grass meadow a limestone rock garden can be viewed. Limestone rock vegetation is relatively common in Hungary, though its species composition is very heterogeneous and rich. This small rocky place is full of rare and valuable plants: feathered pink (Dianthus plumarius ssp. praecox). hawkweed (Hieracium bupleuroides), Sadler's ferula (Ferula sadleriana), aizoon saxifrage (Saxifraga paniculata), nothern dragonhead (Dracocephalum ruyschiana) and blue-green moor grass (Sesleria heufleriana).

In front of the Botanical Gardens' house, the little "island" has been placed in the form of the geophyte garden. Geophytes are early spring perennial species. They appear right after the snow melts, before tree-leafing, usually with dense mass-producing of flowers. The plants take advantage of this time period, when the forest is full of light. By the time the forest turns green, they die back to underground storage organs (bulbs, tubers). Typical examples of the geophyte plants are common snowdrop (Galanthus nivalis), spotted dog (Pulmonaria officinalis), fumeworts (Corydalis spp.), scillas (Scilla spp.), hellebores (Helleborus spp.), European lilyof-the-valley (Convallaria majalis), winter aconite (Eranthis hyemalis) and anemones (Anemone spp.).

A fern garden finds its place in the shadow of the house. Anyone who sees the beauty of the leaves' should take a look at the elegant habitat of hart's-tongue (Phyllitis scolopendrium), lady-fern (Athyrium filixfemina), common polypody (Polypodium vulgare) and hard shield-fern (Polystichum aculeatum). The special fern is Hungarian or Jávorka's scale fern (Asplenium javorkaeanum), whose original habitat is on the semi-shady limestone rocks.

The orchid populations of the garden are very valuable, because they grow naturally with symbiontic connection int he soil. It is due to the undisturbed habitat of the garden for 30-40 years. The two orchid species wich are native to Hungary and grow in the garden is Orchis purpurea and Cephalanthera damasonium. The number of indiviuals has been growing since the clearing of the shrub layer was done in 2010.


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