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Annotated catalogue of seeds and spores (*Index Seminum*) collected from plants cultivated in the Botanical Garden of the Ural Branch of the Russian Academy of Sciences in 2021

Olga A. Kiseleva,* Lidia A. Semkina, Dmitriy Yu. Golikov, Lyudmila M. Dorofeeva, Elena A. Sharova, Evgeniya S. Vasfilova, Olga A. Pervushina, Tatiana A. Vorobiyova and Elena N. Minogina

Russian Academy of Sciences, Ural Branch: Institute Botanical Garden, 8 Marta, 202A, Yekaterinburg, 620144, Russia
Email: seeds@botgard.uran.ru
*Corresponding author. E-mail: kiselevaolga@inbox.ru

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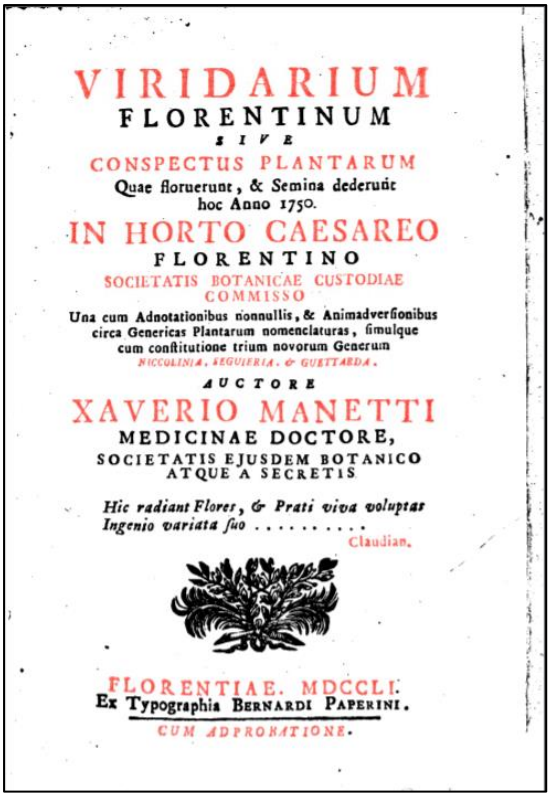
Abstract

The Institute Botanical Garden of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg (BG UB RAS), is located in the southern taiga zone with a moderate continental climate. The cultivation of plants in this region is associated with a high risk of frost damage and therefore the collection of introduced plants is unique for the Middle Urals. It includes ca. 5600 taxa. Many plants in open ground and in greenhouses bloom profusely and produce seeds. The harvest of 2021 is a special one because it is 85 years ago that the Botanical Garden UB RAS was founded. The *Index Seminum* contains a list of the plants that produce seeds and spores and are available for exchange with other botanical gardens and botanical institutions. These seeds and spores were harvested from the plants grown during 2021 season.

Keywords: acclimatization, cultivation, endangered plants, genetic resources, *delectus seminum*, The Urals

Introduction

The compilation and sharing of seed lists (*Index Seminum*) is a traditional way of facilitating the exchange of seeds and valuable information about plants that are cultivated in different botanical gardens around the world. This tradition goes back to the 18th Century when Saverio Manetti, the director of the Botanical Garden in Florence, published his '*Viridarium Florentinum*' (Manetti, 1751, Fig. 1). Since then, numerous seed lists have been published, information on which can be found in the database '*Seed lists*. *Guide to the plant species description published in seed lists from Botanic Gardens*' (2021). These seed lists contain priceless data about the history of the cultivation of plants around the world, their adaptivity in



VIRIDARIUM
FLORENTINUM
SIVE
CONSPECTUS PLANTARUM
Quae floruerunt, & Semina dederunt
hoc Anno 1750.
IN HORTO CAESAREO
FLORENTINO
SOCIETATIS BOTANICAE CUSTODIAE
COMMISSO
Una cum Adnotationibus nonnullis, & Animadversionibus
circa Genericas Plantarum nomenclaturas, simulque
cum constitutione trium novorum Generum
NICCOLINIA. SEGUIERIA. & GUETTARDA.
AUCTORE
XAVERIO MANETTI
MEDICINAE DOCTORE,
SOCIETATIS EJUSDEM BOTANICO
ATQUE A SECRETIS
Hic radiant Flores, & Prati viva voluptas
Ingenio variata suo .....
Claudian.
FLORENTIAE. MDCCLI.
Ex Typographia BERNARDI PAPERINI.
CUM APPROBATIONE.

Figure 1. Title page of *Viridarium Florentum* (Manetti, 1751)

different regions, provide possible ways of monitoring their escape from cultivation, the value of their use and help to find methods of plant conservation. There were many new taxa described in the seed lists. However, this procedure is precluded by the current *International Code of Nomenclature for Algae, Fungi, and Plants* (Turland *et al*., 2018).

There is a traditional structure for seed lists that includes some information about the Botanical Garden, including its address, general climate and geographical characteristics of the place where the Botanical Garden is situated, the list of plants itself and valuable information about the taxa and references to research on the cultivation of some plants. Apart from the information mentioned above, additional information on endangered plants is included and links to the *World Checklist of Vascular Plants* (WCVP, 2021) are provided, where possible, in which every name is linked to three other resources, the nomenclatural database, *International Plant Names Index* (IPNI, 2021) and the taxonomic databases, *Plants of the World Online* (POWO, 2021) and *World Checklist of Selected Plant Families* (WCSP, 2021). More information about these databases can be found in Govaerts *et al*., 2021. Photographs of cultivated plants, an *Agreement on the supply of living plant material for non-commercial purposes* and the *Desiderata* are included in the Appendices.

The Botanical Garden UB RAS occupies an area of approximately 50 ha within the city boundary of Yekaterinburg (Fig 2). The territory of the Botanical Garden includes Old Park (northern part of the garden) and the Arboretum with a pine forest Nature Reserve (southern part of the garden). All buildings, glasshouses, the exhibition and sales pavilion, and the maintenance workshop are located in the Old Park. There are also some of the experimental beds, such as those for herbaceous perennials and medicinal and essential oil-bearing plants, the square with ornamental plants and the Salicetum. The park is divided by two large alleys, Central Alley and Larch Alley, and three smaller alleys, Spruce Alley, Poplar Alley and Willow

Figure 2. Map of the Botanical Garden, UB RAS, Yekaterinburg

Alley. In the Arboretum there are taxonomic collections of trees and shrubs from different families, a woody plants nursery and the collection of endangered plants of the Urals.

Yekaterinburg is in the southern taiga subzone. In the surrounding territories, pine forests of natural origin prevail on soddy podzolic soil and brown forest soil. The climate is moderate continental, with cold winters and warm summers.

The average annual temperature is 2.6°C. The average long-term temperature of the coldest month of the year (January) is -12.6°C. Average long-term temperature of the warmest month of the year (July) is 18.9°C. The absolute minimum and maximum air temperatures are -44.6 and 39.1° C, respectively. The period with average daily air temperatures above 0°C lasts an average of 196 days, mainly from early April to mid-October. The average annual precipitation is 535 mm. The average snow cover depth in February is 42 cm, and the average snow accumulation season is 162 days (Pogodaiklimat, 2021).

Unfavorable climatic factors that result in a short growing period and negatively affect growth and development of plants in open ground, include late spring and early autumn frosts, very few fine weather days (<113) and sharp changes in weather during the day.

Table 1. Air temperature and precipitation during the growing season in 2021

Month	March	April	May	June	July	August	September	October
Average temperature, °C	-5.0	7.0	18.5	19.3	19.3	20.3	8.7	4.4
Average precipitation, mm	20	28	16	52	85	79	24	18

The growing season in 2021 was the hottest and driest in recent years (Table 1). There was no precipitation on 65 days. June, July and August were the hottest months but in July no significant temperature deviation from the norm was observed (Pogodaiklimat, 2021).

Scientific studies of the acclimatization and cultivation of plants from the families listed in the catalogue in the BG UB RAS were undertaken in the last three years for following genera: *Acer* L. (Kiseleva *et al*., 2020); *Astilbe* Buch.-Ham. ex D.Don (Fedyakova *et al*., 2020); *Clematis* L. (Dorofeeva, 2020, 2021; Yurkova and Dorofeeva, 2020); *Cotoneaster* Medik. (Montile *et al*., 2020) *Lithospermum* L. (Lyashenko *et al*., 2021), *Forsythia* Vahl (Vorontsova *et al*., 2020); *Hosta* Tratt. (Kiseleva *et al*., 2019); *Iris* Tourn. ex L. (Kiseleva *et al*., 2020); *Juniperus* L. (Semkina and Tishkina, 2021); *Monarda* L. (Terevgulova *et al*., 2021); *Paeonia* L. (Brusnitsina *et al*., 2019; Sharova *et al*., 2020; Shsherbakova and Brusnitsina, 2020); *Rosa* L. (Fofanova *et al*., 2021); *Salix* L. (Epanchintseva *et al*., 2019; 2021; Epanchintseva and Tishkina, 2020); *Silybum* Adans. (Sharova *et al*., 2019); *Spiraea* L. (Shmurygina and Kiseleva, 2020). The evaluation of the seasonal characteristics of herbaceous plants in connection with their distribution and cultivation in the Urals was made by E.S. Vasfilova with colleagues (Vasfilova, 2019; 2020 a, b). The collection of medicinal plants was described and evaluated as a basis for education (Vasfilova and Vorobyova, 2019 a, b). The possibility of the cultivation of endangered, endemic and relict herbaceous plants was investigated (Kiseleva, 2020; Kiseleva and Sivkova, 2019; Davydov and Kiseleva, 2020; Efremov and Kiseleva, 2020). Collections of subtropical and tropical plants were studied by A.V. Ryndin (2019) and Savitsky with colleagues (2021).

In total, for the exchange with other botanical gardens there are 539 taxa (44 spore plants, 23 gymnosperms and 472 angiosperms). For comparison, in 2018, the list included 437 taxa (Kiseleva *et al.*, 2018).

Material and Methods

The names in the catalogue are ordered alphabetically in families. Abbreviations of authors' names are cited as in the nomenclatural database IPNI (2021). The names of families and placement of the genera follow APG IV (2016). Taxonomic opinions are based on the current literature and taxonomic databases such as in the WSVP (2021), POWO (2021), *World Flora Online* (WFO, 2021), *Catalogue of Life* (CoL). Accepted names are given in bold. Endangered plants are marked with one asterisk (*) and endangered plants of the Ural Region with two asterisks (**). All figures mentioned in the list of taxa are included in Appendix 1.

List of seeds and spores of the plants cultivated in the Botanical Garden UB RAS

Herbaceous plants grown outdoors

POLYPODIOPHYTA

Aspleniaceae

Athyrium filix-femina (L.) Roth

Onoclea struthiopteris (L.) Roth

Polypodiaceae

Dryopteris filix-mas (L.) Schott 'Crispa Cristata'

ANGIOSPERMS

Alismataceae

Alisma plantago-aquatica L.

Amaryllidaceae

Allium aflatunense B.Fedtsch.

Allium angulosum L.

Allium barsczewskii Lipsky

Allium cernuum Roth

Allium hymenorhizum Ledeb.

Allium ledebourianum Schult. & Schult.f.*

Allium lusitanicum Lam.

Allium nutans L.

Allium obliquum L.

Allium pskemense B.Fedtsch

Allium ramosum L.

Allium saxatile M.Bieb.

Apiaceae

Astrantia major L.

Eryngium planum L.

Levisticum officinale W.D.J.Koch

Peucedanum morisonii Besser ex Schult.

Apocynaceae

Asclepias syriaca L.

Asparagaceae

Asparagus officinalis L.* (Appendix, Fig. 2)

Convallaria majalis L.

Hosta sieboldii (Paxton) J.W.Ingram

Hosta `Bressingham Blue`

Hosta `Christmas Tree`

Hosta `Frances Williams`

Hosta `Patriot`

Polygonatum multiflorum (L.) All.

Asphodelaceae

Hemerocallis middendorffii Trautv. & C.A.Mey.

Hemerocallis minor Mill.

Asteraceae

Achillea filipendulina Lam.

Achillea millefolium L.*

Achillea ptarmica L.* (Appendix 1, Fig. 3)

Arnica sachalinensis A.Gray

Centaurea glastifolia L. subsp. ***intermedia*** (Boiss.) L.Martins

Centaurea macrocephala Muss.Puschk. ex Willd.

Centaurea montana L. (Appendix 1, Fig. 4)

Centaurea phrygia L. subsp. ***pseudophrygia*** (C.A.Mey.) Gugler

Coreopsis lanceolata L.

Echinacea pallida (Nutt.) Nutt.

Echinacea purpurea (L.) Moench

Echinacea simulata McGregor

Echinops sphaerocephalus L.

Eutrochium maculatum (L.) E.E.Lamont

Gaillardia × grandiflora Van Houtte (= ***G. aristata*** Pursh × ***G. pulchella*** Foug.)

Grindelia hirsutula Hook. & Arn.

Leuzea carthamoides (Willd.) DC.

Ligularia przewalskii Diels

Ligularia stenocephala (Maxim.) Matsum. & Koidz

Ligularia stenocephala (Maxim.) Matsum. & Koidz. `The Rocket`

Pentanema ensifolium (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.

Saussurea parviflora (Poir.) DC.

Silybum marianum (L.) Gaertn.

Solidago `Golden Dwarf`

Symphyotrichum novi-belgii (L.) G.L.Nesom `White Ladies`

Tagetes erecta L.

Tagetes erecta L. = *Tagetes patula* L.

Telekia speciosa (Schreb.) Baumg. (Appendix 1, Fig. 5)

Boraginaceae

Lindelofia anchusoides (Lindl.) Lehm. subsp. ***macrostyla*** (Bunge) Kamelin

Brassicaceae

Hesperis matronalis L.

Campanulaceae

Campanula glomerata L.

Campanula latifolia L.

Campanula trachelium L.

Caprifoliaceae

Cephalaria gigantea (Ledeb.) Bobrov

Dipsacus fullonum L.

Scabiosa atropurpurea L.

Caryophyllaceae

Dianthus armeria L.

Dianthus chinensis L.

Dianthus praecox Willd. ex Spreng. subsp. ***lumnitzeri*** (Wiesb.) Kmet'ová = *Dianthus gratianopolitanus subsp. moravicus* (Kovanda) Holub*

Dianthus sequieri Vill.

Dianthus knappii (Pant.) Asch. & Kanitz ex Borbás

Gypsophila pacifica Kom.

Silene banksia (Meerb.) Mabb.

Silene chalcedonica (L.) E.H.L.Krause `Rosea`

Crassulaceae

Hylotelephium erythrostictum (Miq.) H.Ohba

Petrosedum rupestre (L.) P.V.Heath

Phedimus aizoon (L.) 't Hart

Phedimus kamtschaticus (Fisch.) 't Hart

Phedimus spurius (M.Bieb.) 't Hart

Sempervivum tectorum L. (Appendix 1, Fig. 6)

Fabaceae

Astragalus falcatus Lam.

Astragalus glycyphyllos L.**

Desmodium canadense (L.) DC.

Hedysarum alpinum L.

Lupinus polyphyllus Lindl.

Melilotus officinalis (L.) Lam.

Gentianaceae

Gentiana lutea L.

Geraniaceae

Geranium collinum Stephan ex Willd.

Hypericaceae

Hypericum perforatum L.

Iridaceae

Iris spuria L. subsp. ***carthaliniae*** (Fomin) B.Mathew*

Iris ensata Thunb. (Appendix 1, Fig. 8)

Iris pseudacorus L.* (Appendix 1, Fig. 9)

Iris sibirica L.* (Appendix 1, Fig. 10)

Iris sibirica L. `Alba` (Appendix 1, Fig. 11)

Iris sibirica L. `Perrys Blue` (Appendix 1, Fig. 12)

Iris versicolor L.*

Iris `Madame Chereau`

Sisyrinchium bermudiana L.

Lamiaceae

Agastache foeniculum (Pursh) Kuntze (Appendix 1, Fig. 13)

Agastache nepetoides (L.) Kuntze

Agastache rugosa (Fisch. & C.A.Mey.) Kuntze `Utrennyaya Svezhest'`

Agastache urticifolia (Benth.) Kuntze `Sinie Vershiny`

Amethystea caerulea L.

Betonica macrantha K.Koch

Dracocephalum moldavica L.

Elsholtzia ciliata (Thunb.) Hyl.

Hyssopus officinalis L.*

Monarda fistulosa L. var. ***menthifolia*** (Graham) Fernald

Nepeta × faassenii Bergmans ex Stearn (= *Nepeta nepitella* L. × *N. racemosa* Lam.)

Nepeta manchuriensis S.Moore

Nepeta subsessilis Maxim.

Phlomoides tuberosa (L.) Moench

Salvia hispanica L.

Salvia nemorosa L.

Salvia przewalskii Maxim.

Stachys byzantina K.Koch `Nezhnost`

Linaceae

Linum usitatissimum L.

Liliaceae

Lilium martagon L.*

Tulipa sylvestris L. subsp. ***australis*** (Link) Pamp. (Appendix 1, Fig. 14)

Malvaceae

Althaea officinalis L.

Malva thuringiaca (L.) Vis.

Onagraceae

Clarkia amoena (Lehm.) A.Nelson & J.F.Macbr. subsp. ***lindleyi*** (Douglas) F.H.Lewis & M.E.Lewis

Paeoniaceae

Paeonia mascula (L.) Mill.

Paeonia officinalis L. `Paula Fay`

Paeonia × suffruticosa Andrews = ***P. jishanensis*** T.Hong & W.Z.Zhao × ***P. rockii*** (S.G.Haw & Launer) T.Hong & J.J.Li ex D.Y.Hong

Paeonia `Chuck Chuck`

Papaveraceae

Eschscholzia californica Cham.

Papaver orientale L. (Appendix 1, Fig. 15)

Phytolaccaceae

Phytolacca americana L.

Plantaginaceae

Antirrhinum majus L. `Night and Day`

Digitalis grandiflora Mill.**

Digitalis lanata Ehrh.

Digitalis lutea L.

Verbascum nigrum L.

Veronica longifolia L.

Veronica spicata L.

Veronica spicata L. `First Love`

Veronica `Baby Doll`

Veronicastrum virginicum (L.) Farw.

Poaceae

Echinochloa crus-galli (L.) P.Beauv.

Festuca glauca Vill.

Melica transsilvanica Schur

Phalaris canariensis L.

Polemoniaceae

Polemonium caeruleum L. (Appendix 1, Fig. 16)

Ranunculaceae

Aconitum anthora L.

Aconitum septentrionale Koelle

Aquilegia coerulea E.James

Aquilegia sibirica Lam.

Aquilegia vulgaris L. `Rosea`

Aquilegia vulgaris L. `White`

Aquilegia *hybrids* (mixture)

Delphinium elatum L.

Thalictrum aquilegiifolium L.

Thalictrum delavayi Franch

Thalictrum foetidum L.

Rosaceae

Acmella oleracea (L.) R.K.Jansen

Aruncus dioicus (Walter) Fernald (Appendix 1, Fig. 17)

Aruncus dioicus (Walter) Fernald `Kneiffii`

Aruncus sylvester Kostel. ex Maxim. var. ***sylvester*** = *Aruncus dioicus* (Walter) Fernald var. *aethusifolius* (H.Lév.) H.Hara

Aruncus dioicus (Walter) Fernald var. *aethusifolius* (H.Lév.) H.Hara `Noble Spirit`

Aruncus dioicus (Walter) Fernald var. *aethusifolius* (H.L,v.) H.Hara `Johannisfest`

Filipendula ulmaria (L.) Maxim. subsp. ***picbaueri*** (Podp.) Smejkal

Filipendula ulmaria (L.) Maxim. `Aurea`

Potentilla nepalensis Hook.

Potentilla pedata Willd. ex Hornem.

Sanguisorba tenuifolia Fisch. ex Link

Rubiaceae

Rubia tinctorum L.

Rutaceae

Dictamnus albus L.

Ruta graveolens L.

Saxifragaceae

Heuchera chlorantha Piper

Solanaceae

Capsicum baccatum L. `Piri-Piri`

Capsicum annuum L. `Prire Fire`

Violaceae

Viola labradorica Schrank

Woody plants grown outdoors

GYMNOSPERMS

Cupressaceae

Juniperus sabina L. `Erecta`

Pinaceae

Abies fraseri (Pursh) Poir.*

Abies veitchii Lindl.*

Abies koreana E.H.Wilson*

Larix gmelinii (Rupr.) Kuzen. var. ***olgensis*** (A.Henry) Ostenf. & Syrach*

Larix sibirica Ledeb.*

Picea abies (L.) H.Karst.

Picea abies (L.) H.Karst. `Virgata`

Picea asperata Mast.*

Picea laxa (Münchh.) Sarg. ≡ *Picea canadensis* (Mill.) Britton, nom. illeg.*

Picea laxa (Münchh.) Sarg. `Coerulea`

Picea laxa (Münchh.) Sarg. `Glauca`

Picea engelmannii Parry ex Engelm.*

Picea jezoensis (Siebold & Zucc.) Carrière*

Picea mariana (Mill.) Britton, Sterns & Poggenb.*

Picea omorika (Pancic) Purk.*

Picea rubens Sarg.*

Picea koyamae Shiras.*

Pinus banksiana Lamb.*

Pinus koraiensis Siebold & Zucc.*

Pinus strobus L.*

Pseudotsuga macrocarpa (Vasey) Mayr*

Taxaceae

Taxus baccata L.*

ANGIOSPERMS

Araliaceae

Aralia cordata Thunb.*

Aralia mandshurica Rupr. & Maxim.*

Eleutherococcus senticosus (Rupr. & Maxim.) Maxim.*

Eleutherococcus sessiliflorus (Rupr. & Maxim.) S.Y.Hu*

Actinidiaceae

Actinidia kolomikta (Maxim.) Maxim.

Aristolochiaceae

Aristolochia manshuriensis Kom.*

Aristolochia macrophylla Lam.

Berberidaceae

Berberis aggregata C.K.Schneid.

Berberis amurensis Rupr.

Berberis amurensis Rupr. var. ***amurensis*** = *Berberis amurensis* var. *japonica* (Regel) Rehder

Berberis aquifolium Pursh

Berberis brachypoda Maxim.

Berberis diaphana Maxim.

Berberis karkaralensis Kornil. & Potopov*

Berberis koreana Palib.

Berberis oblonga (Regel) C.K.Schneid.

Berberis thunbergii DC.

Berberis thunbergii DC. `Aurea`

Berberis thunbergii DC.`Atropurpurea`

Berberis vulgaris L.

Berberis* × *emarginata Willd. (= ***B. sibirica*** Pall. × ***B. vulgaris*** L.) = *Berberis vulgaris* L. var. *emarginata* (Willd.) Gordon

Betulaceae

Betula ermanii Cham.*

Betula fruticosa Pall.*

Betula lenta L.*

Betula pendula Roth. `Dalecarlica`

Carpinus betulus L.*

Corylus avellana L. `Atropurpurea`

Caprifoliaceae

Lonicera alpigena L.*

Lonicera ferdinandi Franch.

Lonicera chrysantha Turcz. ex Ledeb. var. ***chrysantha*** = *Lonicera gibbiflora* (Rupr. & Maxim.) Dipp.*

Lonicera involucrata (Richardson) Banks ex Spreng.

Lonicera maackii (Rupr.) Maxim.*

Lonicera morrowii A.Gray

Lonicera reticulata Raf.

Lonicera ruprechtiana Regel

Lonicera tatarica L.

Symphoricarpos albus (L.) S.F.Blake

Weigela middendorffiana (Carrière) K.Koch

Weigela praecox (Lemoine) L.H.Bailey

Celastraceae

Euonymus alatus (Thunb.) Siebold

Euonymus maackii Rupr.*

Euonymus macropterus Rupr.*

Euonymus nanus M.Bieb.*

Euonymus verrucosus Scop.*

Cercidiphyllaceae

Cercidiphyllum japonicum Siebold & Zucc. ex J.J.Hoffm. & J.H.Schult.bis*

Cornaceae

Cornus alba L.*

Dioscoreaceae

Dioscorea caucasica Lypsky*

Elaeagnacea

Shepherdia argentea (Pursh) Nutt.*

Ericaceae

Rhododendron canadense (L.) Torr.

Rhododendron canadense (L.) Torr. `Albiflorum`

Rhododendron catawbiense Michx.*

Rhododendron dauricum L. = *Rhododendron ledebourii* Pojark.*

Rhododendron japonoheptamerum Kitam. = *Rhododendron japonicum* (Blume) C.K.Schneid. (Appendix 1, Fig. 19)

Rhododendron luteum Sweet*

Rhododendron maximum L.*

Rhododendron schlippenbachii Maxim.*

Rhododendron smirnowii Trautv. ex Regel*

Rhododendron yakushimanum Nakai

Fabaceae

Chamaecytisus ruthenicus (Fisch. ex Wol.) Klásk.*

Lespedeza bicolor Turcz.*

Maackia amurensis Rupr.*

Fagaceae

Quercus robur L.*

Hydrangeaceae

Deutzia parviflora Bunge var. ***parviflora*** = *D. amurensis* (Regel) Airy Shaw*

Hydrangea bretschneideri Dippel

Philadelphus coronarius L. = *Philadelphus zeyheri* Schrad. ex DC.

Philadelphus coronarius L. `Aureus`

Philadelphus henryi Koehne

Philadelphus incanus Koehne

Philadelphus inodorus L. = *Philadelphus floribundus* Schrad. ex DC.

Philadelphus lewisii Pursh

Philadelphus × ***monstruosus*** Schelle ex Rehder (= ***P. lewisii*** Push × ***P. pubescens*** Loisel.)

Philadelphus subcanus Koehne var. ***magdalenae*** (Koehne) S.Y.Hu ≡ *Philadelphus magdalenae* Koehne

Philadelphus satsumi Siebold ex Lindl. & Paxton

Philadelphus schrenkii Rupr.*

Philadelphus tomentosus Wall ex G. Don

Philadelphus × virginalis Rehder (= ***P. coronarius*** L. × ***P. microphyllus*** A.Gray × ***P. pubescens*** Loisel)

Juglandaceae

Juglans mandshurica Maxim.* (Appendix 1, Fig. 21)

Malvaceae

Tilia amurensis Rupr.

Tilia cordata Mill.*

Tilia mandshurica Rupr. & Maxim.

Tilia platyphyllos Scop.*

Menispermaceae

Menispermum canadense L.

Menispermum dauricum DC.*

Oleaceae

Forsythia ovata Nakai* (Appendix 1, Fig. 22)

Fraxinus chinensis Roxb. subsp. ***rhynchophylla*** (Hance) A.E.Murray*

Fraxinus pennsylvanica Marshall*

Syringa × henryi C.K.Schneid. (= ***S. josikaea*** J.Jacq. ex Rchb. × ***S. villosa*** Vahl)

Syringa josikaea J.Jacq. ex Rchb.*

Syringa komarowii C.K.Schneid.

Syringa × prestoniae McKelvey (= *S. komarowii* C.K.Schneid. subsp. *reflexa* (C.K.Schneid.) P.S.Green & M.C.Chang × *S. villosa* Vahl**)**

Syringa pubescens Turcz. subsp. ***patula*** (Palib.) M.C.Chang & X.L.Chen

Syringa reticulata (Blume) H.Hara subsp. ***amurensis*** (Rupr.) P.S.Green & M.C.Chang*

Syringa tomentella Bureau & Franch.

Syringa tomentella Bureau & Franch. subsp. ***sweginzowii*** (Koehne & Lingelsh.) Jin Y.Chen & D.Y.Hong

Syringa villosa Vahl*

Syringa vulgaris L.

Ranunculaceae

Clematis alpina (L.) Mill.*

Clematis alpina (L.) Mill. `Pink Flamingo`

Clematis alpina (L.) Mill. subsp. ***ochotensis*** (Pall.) Kuntze

Clematis alpina (L.) Mill. subsp. ***sibirica*** (L.) Kuntze

Clematis fusca Turcz.*

Clematis fusca Turz. var. ***fusca*** = *Clematis ianthina* Koehne

Clematis fusca Turcz. `Dwarf`

Clematis glauca Willd.*

Clematis hexapetala Pall.

Clematis hexapetala Pall. 'Angustifolia'

Clematis integrifolia L.*

Clematis integrifolia L. `Hanajima`

Clematis macropetala Ledeb. `Rosy O Grady`

Clematis recta L.*

Clematis recta L. 'Purpurea'

Clematis tangutica (Maxim.) Korsh.

Clematis terniflora DC. var. ***mandshurica*** (Rupr.) Ohwi

Rhamnaceae

Rhamnus cathartica L.*

Rosaceae

Alniaria alnifolia (Siebold & Zucc.) Rushforth*

Cotoneaster acutifolius Turcz. = *Cotoneaster lucidus* Schltdl.

Chaenomeles japonica (Thunb.) Lindl. ex Spach (Appendix 1, Fig. 23)

Cotoneaster ignavus E.L.Wolf

Cotoneaster multiflorus Bunge

Cotoneaster niger (Ehrh.) Fr. = *Cotoneaster melanocarpus* Fisch. ex Blytt.

Cotoneaster submultiflorus Popov*

Crataegus ambigua C.A.Mey. ex A.K.Becker subsp. ***ambigua*** = *Crataegus volgensis* Pojark.*

Crataegus aprica Beadle

Crataegus chlorocarpa Lenné & K.Koch

Crataegus chrysocarpa Ashe = *Crataegus keepii* Sarg.

Crataegus chrysocarpa Ashe var. ***faxonii*** (Sarg.) Eggl.

Crataegus coccinea L. var. ***coccinea*** = *Crataegus pedicellata* Sarg.

Crataegus coccinea L. var. ***pringlei*** (Sarg.) J.A.Macklin & J.B.Phipps

Crataegus crus-galli L.

Crataegus dahurica (Dieck) Koehne

Crataegus douglasii Lindl.

Crataegus dsungarica Zabel ex Lange

Crataegus flabellata (Bosc ex Spach) K.Koch

Crataegus hissarica Pojark.

Crataegus holmesiana Ashe

Crataegus horrida Medik.

Crataegus irrasa Sarg.

Crataegus jonesae Sarg.

Crataegus laevigata (Poir.) DC.*

Crataegus lucorum Sarg.

Crataegus lumaria Ashe

Crataegus macracantha Lodd. ex Loudon

Crataegus maximowiczii C.K.Schneid.*

Crataegus monogyna Jacq. = *Crataegus alemanniensis* Cinovskis*

Crataegus nigra Waldst. et. Kit.

Crataegus persimilis Sarg.

Crataegus pinnatifida Bunge*

Crataegus rhipidophylla Gand. var. ***rhipidophylla*** = *Crataegus curvisepala* Lindm.*

Crataegus rhipidophylla Gand. var. ***lindmanii*** (Hrabetová) K.I.Chr.

Crataegus *schuettei* Ashe var. ***schuettei*** = *Crataegus basilica* Beadle

Crataegus songarica K.Koch

Crataegus submollis Sarg.

Crataegus succulenta Schrad. ex Link

Crataegus tianschanica Pojark.

Dasiphora fruticosa (L.) Rydb.*

Dasiphora fruticosa (L.) Rydb. var***. fruticosa*** = *Pentaphylloides × friedrichsenii* (Spath ex C.K.Schneid.) Soják

Dasiphora glabrata (Willd. ex Schltdl.) Soják*

Malus baccata (L.) Borkh. var. ***baccata*** = *Malus cerasifera* Spach

Malus domestica (Suckow) Borkh. = *Malus niedzwetzkyana* Dieck

Malus fusca (Raf.) C.K.Schneid.

Malus mandshurica (Maxim.) Kom. ex Skvortsov

Malus × purpurea (A.Barbier) Rehder (= ***M. domestica*** (Suckow) Borkh. × ***M. halliana*** Koehne × ***M. toringo*** (Siebold) de Vriese)

Malus toringoides (Rehder) Hughes

Malus × zumi (Matsum.) Rehder (= ***M. mandshurica*** (Maxim.) Kom. ex Skvortsov × ***M. toringo*** (Siebold) de Vriese)

Physocarpus opulifolius (L.) Maxim.

Prinsepia sinensis (Oliv.) Hallier

Prunus × subhirtella Miq. (= ***P. incisa*** Thunb. × ***P. itosakura*** Siebold)

Prunus glandulosa Thunb.

Prunus mandshurica (Maxim.) Koehne* (Appendix 1, Fig. 24)

Prunus pumila L.

Prunus sibirica L.*

Prunus spinosa L.*

Prunus tenella Batsch*

Prunus virginiana L. `Atropurpurea`

Rosa acicularis Lindl.*

Rosa canina L.*

Rosa corymbifera Borkh.*

Rosa dauurica Pall. var. ***dauurica*** = *Rosa amblyotis* C.A.Mey.*

Rosa gallica L.*

Rosa glabrifolia C.A.Mey. ex Rupr.*

Rosa glauca Pourr.*

Rosa macrophylla Lindl.

Rosa nutkana C.Presl.

Rosa oxyodon Boiss.*

Rosa pulverulenta M.Bieb.*

Rosa rugosa Thunb.

Rosa spinosissima L.*

Rosa tomentosa Sm.*

Rosa villosa L.*

Rosa `Dart`s Defender`= (***R. rugosa*** Thunb. × ***R. nitida*** Willd.)

Scandosorbus intermedia (Ehrh.) Sennikov*

Sorbaria sorbifolia (L.) A.Braun.

Sorbus aucuparia L.

Sorbus aucuparia L. subsp. ***glabrata*** (Wimm. & Grab.) Hedl. = *Sorbus sibirica* (Hedl.) Prain

Sorbus aucuparia L. subsp. ***pohuashanensis*** (Hance) McAll.

Sorbus discolor (Maxim.) Maxim.

Sorbus esserteauana Koehne

Sorbus koehneana C.K.Schneid.*

Sorbus scopulina Greene

Spiraea alpina Pall.

Spiraea bella Sims

Spiraea betulifolia Pall.

Spiraea canescens D.Don.*

Spiraea chamaedryfolia L.

Spiraea corymbosa Raf.

Spiraea douglasii Hook.

Spiraea douglasii Hook. var. ***menziesii*** (Hook.) C.Presl = *S. douglasii* subsp. *menziesii* (Hook.) Calder & Roy L.Taylor

Spiraea japonica L.f.

Spiraea japonica L.f. var. ***japonica*** = *Spiraea bumalda* Burv.

Spiraea media Schmidt

Spiraea media Schmidt subsp. ***media*** = *Spiraea sericea* Turcz.

Spiraea nipponica Maxim.

Spiraea* × *rosalba Dippel (= ***S. alba*** Du Roi × ***S. salicifolia*** L.)

Spiraea rosthornii E.Pritz.

Spiraea salicifolia L.

Spiraea* × *semperflorens Zabel (= ***S. japonica*** L.f. × ***S. salicifolia*** L.)

Spiraea* × *superba (Froebel ex Zabel) Zabel ex Dieck (= ***S. japonica*** L.f. × ***S. betulifolia*** var. ***corymbosa*** (Raf.) Maxim.) = *Spiraea* × *margaritae* Zabel

Spiraea trichocarpa Nakai

Spiraea trilobata L.

Spiraea* × *microthyrsa Zabel = (***S. alba*** Du Roi × ***S. media*** Schmidt)

Spiraea* × *schinabeckii Zabel = (***S. chamaedryfolia*** L. × ***S. trilobata*** L.)

Rutaceae

Phellodendron amurense Rupr.

Sapindaceae

Acer barbinerve Maxim.*

Acer campestre L.*

Acer caudatum Wall. subsp. ***ukurundense*** (Trautv. & C.A.Mey.) E.Murray*

Acer platanoides L.* (Appendix 1, Fig. 25)

Acer pseudosieboldianum (Pax) Kom.* (Appendix 1, Fig. 26)

Acer spicatum Lam.*

Acer tataricum L.*

Acer tataricum L. subsp. ***ginnala*** (Maxim.) Wesm.*

Acer tataricum L. subsp. ***semenovii*** (Regel & Herder) A.E.Murray*

Acer tegmentosum Maxim.*

Aesculus hippocastanum L.* (Appendix 1, Fig. 27)

Schisandraceae

Schisandra chinensis (Turcz.) Baill.

Viburnaceae

Sambucus kamtschatica E.L.Wolf

Sambucus racemosa L.

Sambucus sibirica Nakai

Sambucus sieboldiana (Miq.) Graebn.

Sambucus williamsii Hance = *Sambucus coreana* (Nakai) Kom. & Aliss.

Viburnum lantana L.* (Appendix 1, Fig. 18)

Viburnum opulus L.*

Viburnum sargentii Koehne*

Vitaceae

Ampelopsis aconitifolia Bunge

Parthenocissus quinquefolia (L.) Planch.*

Vitis amurensis Rupr.

Plants grown in glasshouses

PTERIDOPHYTES

Aspleniaceae

Asplenium bulbiferum G.Forst.

Asplenium nidus L.

Asplenium nidus L. `Osaka`

Blechnum brasiliense Desv.

Blechnum gibbum (Labill.) Mett.

Blechnum spinulosum Poir.

Cyatheaceae

Culcita macrocarpa C.Presl*

Dicksonia sellowiana (C.Presl) Hook.

Sphaeropteris cooperi (F. Muell.) R.M. Tryon

Polypodiaceae

Cyrtomium falcatum (L.f.) C.Presl

Cyrtomium falcatum (L.f.) C.Presl `Rochefordianum`

Davallia pentaphylla Blume

Drynaria meyeniana (Schott) Christenh.

Drynaria quercifolia (L.) J.Sm.

Leptochilus ellipticus (Thunb.) Noot.

Lomariopsis tenuifolia (Desv.) Christ

Microsorum musifolium (Blume) Copel.

Microsorum punctatum (L.) Copel.

Microsorum scolopendria (Burm.f.) Copel.

Platycerium bifurcatum (Cav.) C.Chr.

Polystichum setiferum (Forssk.) T.Moore ex Woynar

Pyrrosia angustata (Sw.) Ching

Rumohra adiantiformis (G.Forst.) Ching

Serpocaulon triseriale (Sw.) A.R.Sm.

Serpocaulon triseriale (Sw.) A.R.Sm. `Corymbifera`

Tectaria cicutaria (L.) Copel.

Tectaria fauriei Tagawa

Pteridaceae

Adiantum capillus-veneris L.*

Adiantum caudatum L.

Adiantum cunninghamii Hook.

Adiantum hispidulum Sw.

Adiantum hispidulum Sw. `Bronze Venus`

Adiantum raddianum C.Presl `Gracillimum`

Adiantum raddianum C.Presl `Micropinnulum`

Hemionitis calomelanos (Sw.) Christenh.

Hemionitis nobilis (T.Moore) Christenh.

Hemionitis ovata (Desv.) Christenh.

Hemionitis palmata L.

Schizaeaceae

Lygodium japonicum (Thunb.) Sw.

Anemia dregeana Kunze

Thelypteridaceae

Macrothelypteris torresiana (Gaudich.) Ching

ANGIOSPERMS

Acanthaceae

Barleria repens Nees

Ecbolium viride (Forssk.) Alston

Crossandra infundibuliformis (L.) Nus subsp. ***arida*** L.H.Cramer*

Crossandra massaica Mildbr.

Aizoaceae

Mestoklema tuberosum (L.) N.E.Br. ex Glen

Amaryllidaceae

Clivia miniata (Lindl.) Verachaff.

Asteraceae

Bartlettina sordida (Less.) R.M.King & H.Rob.

Crassocephalum vitellinum (Benth.) S.Moore

Araceae

Aglaonema robeleynii (Van Geert) Pitcher & Manda = *Aglaonema crispum* (Pitcher & Manda) Nicolson

Arecaceae

Rhopalostylis baueri (Hook.f.) H.Wendl. & Drude

Aristolochiaceae

Aristolochia littoralis Parodi

Apocynaceae

Alyxia buxifolia R.Br.

Asparagaceae

Agave macroacantha Zucc.*

Agave vera-cruz Mill.

Asparagus densiflorus (Kunth) Jessop

Arthropodium candidum Raoul `Little lilia`

Chlorophytum filipendulum Ker Gawl. subsp. ***amaniense*** (Engl.) Nordal & A.D.Poulsen `Orange Marmalade`

Chlorophytum brachystachyum Baker

Chlorophytum macrophyllum (A.Rich.) Asch.

Chlorophytum madagascariense Baker

Basellaceae

Basella alba L.

Begoniaceae

Begonia ampla Hook.f.

Begonia rajah Ridl.

Bromeliaceae

Acanthostachys strobilacea (Schult. & Schult.f.) Klotzsch

Guzmania lingulata (L.) Mez

Pitcairnia paniculata (Ruiz & Pav.) Ruiz & Pav.

Cactaceae

Mammillaria glassii R.A.Foster*

Mammillaria magnimamma Haw.* (Appendix 1, Fig. 28)

Mammillaria prolifera (Mill.) Haw.* (Appendix 1, Fig. 29)

Mammillaria prolifera (Mill.) Haw. subsp. ***texana*** (Engelm.) D.R.Hunt

Mammillaria spinosissima Lem.*

Parodia haselbergii (Haage ex Rümpler) F.H.Brandt = *Brasilicactus haselbergii* (Haage ex Rumpl.) Backeb. ex Jul.Schäff.

Pseudorhipsalis ramulosa (Salm-Dyck) Barthlott*

Thelocactus setispinus (Engelm.) E.F.Anderson

Cannaceae

Canna indica **L.**

Dioscoreaceae

Tacca chantrieri **André**

Euphorbiaceae

Euphorbia bubalina **Boiss.**

Gesneriaceae

Aeschynanthus longicaulis **Wall. ex R.Br.**

Lythraceae

Punica granatum L. `Nana`

Melastomataceae

Calvoa orientalis Taub.

Moraceae

Dorstenia contrajerva L.

Dorstenia hildebrandtii Engl.*

Musaceae

Musa mannii H.Wendl. ex Baker

Myrtaceae

Feijoa sellowiana (O.Berg) O.Berg

Psidium cattleyanum Sabine

Psidium guajava L.

Petiveriaceae

Rivina humilis L.

Phylanthaceae

Phyllanthus angustifolius **(Sw.) Sw.**

Rubiaceae

Coffea arabica L.

Strelitziaceae

Strelitzia nicolai Regel & Körn.

Verbenaceae

Lantana camara L.

Zingiberaceae

Hedychium horsfieldii R.Br. ex Wall.

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Author's contributions

Dmitriy Yu. Golikov curated the collection of conifers tree and shrub species and compiled seed lists of Gymnosperms. Elena A. Sharova curated the collection of paeonies and compiled seed lists of this group.

Elena N. Minogina curated the collection of species from tropical and subtropical zones and compiled seed lists of plants grown in greenhouses. She prepared the first draft of the manuscript.

Evgeniya S. Vasfilova curated the collection of medicinal plants and compiled seed lists of medicinal and spicy/aromatic plants.

Lidia A. Semkina curated the collection of trees and shrubs and compiled seed lists of Rosaceae, Ericaceae, Sapindaceae, and Juglandaceae.

Lyudmila M. Dorofeeva curated the collection of woody vines and lianas and compiled lists of climbing plants.

Olga A. Kiseleva curated the ornamental perennials collection. She finalized the manuscript for publication and co-ordinated the last stage of the project.

Olga A. Pervushina curated arid zone plants and compiled seed lists of Cactaceae, Crassulaceae, Euphorbiaceae, Asparagaceae and other arid taxa that have been grown in greenhouses.

Tatiana A. Vorobiyova curated the collection of spicy/aromatic plants and compiled the seed list of taxa from this group.

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APPENDIX 1

Images of plants cultivated in the Botanical Garden UB RAS, Yekaterinburg

Figure 1. *Onoclea struthiopteris* (L.) Roth, Yekaterinburg, Botanical Garden UB RAS, 15 May 2021. Photograph by N.Yu. Grudanuv.

Figure 2. *Asparagus officinalis* L., Yekaterinburg, Botanical Garden UB RAS, 16 September 2019. Photograph by O.A. Kiseleva.

Figure 3 *Achillea ptarmica* L., Yekaterinburg, Botanical Garden UB RAS, 18 July 2016. Photograph by O.A. Kiseleva

Figure 4**.** *Centaurea montana* L., Yekaterinburg, Botanical Garden UB RAS, 3 June 2021. Photograph by N.Yu. Grudanuv

Figure 5. *Telekia speciosa* (Schreb.) Baumg., Yekaterinburg, Botanical Garden UB RAS, 21 July 2010. Photograph by O.A. Kiseleva

Figure 6. *Sempervivum tectorum* L., Yekaterinburg, Botanical Garden UB RAS, 24 September 2016. Photograph by O.A. Kiseleva

Figure 7**.** *Iris spuria* subsp. *carthaliniae* (Fomin) B.Mathew**,** Yekaterinburg, Botanical Garden UB RAS, 15 June 2019. Photograph by N.V. Zaboeva

Figure 8. *Iris ensata* Thunb., Yekaterinburg, Botanical Garden UB RAS, 10 June 2019. Photograph by N.V. Zaboeva

Figure 9. *Iris pseudacorus* L. Yekaterinburg, Botanical Garden UB RAS, 8 June 2019. Photograph by N.V. Zaboeva.

Figure 10. *Iris sibirica* L., Yekaterinburg, Botanical Garden UB RAS, 1 June 2020. Photograph by N.V. Zaboeva

Figure 11. *Iris sibirica* L. `Alba` Yekaterinburg, Botanical Garden UB RAS, 3 June 2020. Photograph by N.V. Zaboeva

Figure 12. *Iris sibirica* L. `Perrys Blue`, Yekaterinburg, Botanical Garden UB RAS, 5 June 2020. Photograph by N.V. Zaboeva

Figure 13. *Agastache foeniculum* (Pursh) Kuntze, Yekaterinburg, Botanical Garden UB RAS, 29 August 2006. Photograph by E.S. Vasfilova

Figure 14. *Tulipa sylvestris* subsp. *australis* (Link) Pamp., Yekaterinburg, Botanical Garden UB RAS, 31 May 2018. Photograph by O.A. Kiseleva

Figure 15. *Papaver orientale* L., Yekaterinburg, Botanical Garden UB RAS, 3 June 2021. Photograph by N.Yu. Grudanuv

Figure 16. *Polemonium caeruleum* L., Yekaterinburg, Botanical Garden UB RAS, 3 June 2019. Photograph by E.S. Vasfilova

Figure 17. *Aruncus dioicus* (Walter) Fernald, Yekaterinburg, Botanical Garden UB RAS, 3 June 2021. Photograph by N.Yu. Grudanuv

Figure 18. *Viburnum lantana* L., Yekaterinburg, Botanical Garden UB RAS, 31 August 2021. Photograph by N.Yu. Grudanuv

Figure 19. *Rhododendron japonoheptamerum* Kitam., Yekaterinburg, Botanical Garden UB RAS, 5 June 2017. Photograph by A.A. Kochubeĭ

Figure 20. *Rhododendron ledebourii* Pojark., Yekaterinburg, Botanical Garden UB RAS, 30 April 2021. Photograph by N.Yu. Grudanuv

Figure 21. *Juglans mandshurica* Maxim., Yekaterinburg, Botanical Garden UB RAS, 15 May 2021. Photograph by N.Yu. Grudanuv

Figure 22. *Forsythia ovata* Nakai, Yekaterinburg, Botanical Garden UB RAS, 12 May 2008. Photograph by O.V. Epanchintseva

Figure 23. *Chaenomeles japonica* (Thunb.) Lindl. ex Spach, Yekaterinburg, Botanical Garden UB RAS, 5 June 2020. Photograph by N.Yu. Grudanuv

Figure 24. *Prunus mandshurica* (Maxim.) Koehne, Yekaterinburg, Botanical Garden UB RAS, 12 May 2008. Photograph by O.V. Epanchintseva

Figure 25. *Acer platanoides* L., Yekaterinburg, Botanical Garden UB RAS, 24 May 2013. Photograph by O.V. Epanchintseva

Figure 26. *Acer pseudosieboldianum* (Pax) Kom., Yekaterinburg, Botanical Garden UB RAS, 7 June 2011. Photograph by O.V. Epanchintseva

Figure 27. *Aesculus hippocastanum* L., Yekaterinburg, Botanical Garden UB RAS, 7 June 2011. Photograph by O.V. Epanchintseva

Figure 28. *Mammillaria magnimamma* Haw., Yekaterinburg, Botanical Garden UB RAS, 19 August 2020. Photograph by O.A. Pervushina

Figure 29. *Mammillaria prolifera* (Mill.) Haw., Yekaterinburg, Botanical Garden UB RAS, 19 August 2020. Photograph by O.A. Pervushina

APPENDIX 2

Agreement on the supply of living plant material for non-commercial purposes by the Institute Botanical Garden UB RAS, Yekaterinburg

Against the background of the provisions and decisions of the Convention on Biological Diversity of 1992 (CBD) and, in particular, those on access to genetic resources and benefit-sharing, the garden is dedicated to promoting the Conservation, sustainable use, and research of biological diversity. The garden therefore expects its partners in acquiring, maintaining and transferring plant material to always act in accordance with the CBD and the Convention on the International Trade in Endangered Species (CITES).

The responsibility for legal handling of the plant material passes on to the recipient upon receipt of the material. The requested plant material will be supplied to the recipient only on the following conditions:

1. Based on this agreement, the plant material is supplied only for non-commercial use such as scientific study and educational purposes as well as environmental protection. Should the recipient, at a later date, intend a commercial use or a transfer for commercial use, the country of origin´s prior informed consent (PIC) must be obtained in writing before the material is used or transferred. The recipient is responsible for ensuring an equitable sharing of benefits.
2. On receiving the plant material, the recipient endeavors to document the received plant material, its origin (country of origin, first receiving garden, "donor" of the plant material, year of collection) as well as the acquisition and transfer conditions in a comprehensible manner.
3. If scientific publications are produced based on the supplied plant material, the recipient is obliged to indicate the origin of the material (supplying garden and if known the country of origin) and to send these publications to the garden and to the country of origin without request.
4. On request, the garden will forward relevant information on the transfer of the plant material to the body charged with implementing the CDB2.
5. The recipient may transfer the received plant material to third parties only under these terms and conditions and must document the transfer in a suitable manner.

_____

I accept the above conditions.

_____

Date, Signature

_____

Recipient´s name and address, stamp

1. According to the CBD "genetic resources" means genetic material of actual or potential value. This definition covers both living and not living material. The Code of Conduct and the IPEN covers only the exchange of living plant material (living plants or parts of plants, diasporas) thus falling in the definition of genetic resources.
2. Ideally, the national focal point in the garden´s home country

We would like to point out that the offered seeds are the result of open pollination. Please send the Desiderata to seeds@botgard.uran.ru before April 15, 2022

Address: Seed Curator: Minogina Elena Nikolaevna, Russian Academy of Sciences, Ural Branch: Institute Botanic Garden, st. 8 Marta, 202a, Ekaterinburg, Russia, 620144
Your address:

Desiderata
