



CHICAGO BOTANIC GARDEN

Chicago Botanic Garden

COLLECTIONS POLICY

July 2018

COLLECTIONS POLICY

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Mission Statement

We cultivate the power of plants to sustain and enrich life.

Intent of Collections Policy Document

This Collections Policy defines the purpose and scope to the plant collections at the Chicago Botanic Garden. As a working document, this policy will empower the Garden to collect and procure plant material that supports all aspects of our mission. Plant material includes living plants, seeds, cuttings, herbarium vouchers, DNA samples, and tissue cultures.

The Collections Policy is a central component of the Garden's mission and exists to support all functions of the Garden, including:

- Display Plant Collections
- Plant Exploration
- Plant Evaluation
- Plant Breeding
- Chicagoland Grows® Plant Introduction Program
- Education Programs – adult, youth, family, teacher and student
- Horticulture Therapy Program
- Science and Conservation Programs

Purpose of Collections

By acquiring, documenting, and studying plants suitable for our climate, the Garden will be able to share knowledge and germplasm with both the public and scientific community. Other portions of our plant collections include tropical, subtropical, and tender plants that are grown in climatically appropriate settings. The living collections are used in display gardens as well as educational programming, interpretive signage, and, alongside herbarium vouchers, stored seeds, and DNA samples, research conducted by garden staff and scientists. This collaboration between display gardens, education, and research provides visitors with a better understanding of plants, their role in gardens, ecosystems, and biodiversity while creating a valuable aesthetic experience within the Garden.

Scope of Collections

The living collections of the Garden are divided into three main categories:

- 1) Display Plant Collections
- 2) Research Collections
- 3) Conservation and Science

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1) Display Plant Collections

The display plant collections are the most visible portion of the gardens collections, and are carefully curated to support the Garden's mission. These collections are permanent, living collections, and are planted in-ground, kept under glass, or displayed seasonally throughout the Garden. The display plant collections of the Garden focus on plants best-suited for the climate and soil conditions of the upper Midwest, as well as specialty collections of tender tropical, subtropical, and arid flora. Both native and nonnative plants are regularly acquired for the permanent plant collections. New acquisitions go through a rigorous curatorial process, and are well-documented with regards to their provenance, source, and propagation history. Any new acquisitions intended for the display plant collections must contribute to the goals of existing display gardens.

Seasonal Display Collections

Seasonal plant collections are used to support the annual displays and thematic events around the Garden. Examples of seasonal collections include temperate and tropical perennials that are used as a recurring part of outdoor displays, where they would not survive the winter. Those plants used for more than a single growing season, or as part of a recurring display (e.g. tropical waterlilies in the Aquatic Garden) are accessioned as a part of the Garden's permanent plant collection. Prominent taxa in this collection are tropical *Nymphaea*, *Musa*, various palms, and *Alocasia*, among other non-hardy, ornamental perennials. A large collection of tender *Chrysanthemum* and *Dendranthema* is maintained as part of a large seasonal display. Tender stock plants like *Hibiscus*, *Coleus*, and *Pelargonium* are accessioned as a part of the permanent collection, and used to propagate new bedding plants annually.

Permanent Display Gardens

The following display gardens house collections that serve as aesthetic examples and educational models for visitors interested in plants and gardening. They contain both plants native to this region and exotics from around the world. The acquisition criteria and a description of the collections contained in each display garden as follows:

Aquatic Garden

Situated below the Graham Bulb Garden, the Aquatic Garden extends over the lake via a system of boardwalks that wind among plantings of various water lilies, lotus, and emergent aquatic plants in containers. The purpose of the Aquatic Garden is to highlight expanded uses of and unique collections of water-loving plants. The collection is primarily focused on over 50 species and cultivars of *Nymphaea* and *Nelumbo*, but also highlights less common aquatics and emergents, such as *Bacopa monnieri*, *Zantedeschia aethiopica*, cultivars of *Canna* and *Colocasia*, and even water-loving trees like *Taxodium distichum*.

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Bonsai Collection

The Chicago Botanic Garden bonsai collection is one of the most diverse and refined collections in North America. The collection has over 250 accessions and 150 different taxa consisting mainly of hardy species, but also including sub-tropical and tropical taxa from 38 plant families. About 40 trees are displayed for visitors in outdoor courtyards from about April 21st –Oct 30th. Conifers are well-represented in the bonsai collection, with nearly 80 specimens in the Cupressaceae, Pinaceae, Taxaceae, and Taxodiaceae families. There are also noteworthy specimens in other families, like several *Enkianthus* and *Rhododendron* species, species from flowering Rosaceae genera like *Amelanchier*, *Crataegus*, *Prunus*, *Pseudocdonia*, and *Pyracantha*, as well as some taxa less common in the Midwest like *Galphimia*, *Grewia*, *Olea*, and *Severina*. The collection has recently been given the distinction of a World Bonsai Friendship Federation Cooperative Center, an honor given to just four other collections in the country.

Graham Bulb Garden

The Graham Bulb Garden contains a collection of geophytic plants from around the world and seasonal displays of common and unusual perennial plants. *Narcissus*, *Tulipa*, *Lilium*, *Allium*, *Iris*, *Fritillaria*, *Scilla*, *Camassia*, and *Colchicum* dominate the collection in this garden with an emphasis on large masses and seasonal overlap of blooms.

Grunsfeld Children's Growing Garden

The Children's Growing Garden is divided into two outdoor garden classrooms, with a combined total of six raised beds, six in-ground demonstration beds, and five display beds. Wheelchair-accessible trays in the raised beds enable students of all abilities to join in the activities. While the growing plants in the raised beds are watered and weeded, the demonstration beds (maintained by horticulturists) show young participants what their plants will look like when they are grown.

The garden is surrounded by an open-weave fence covered with different varieties of climbing plants, creating a safe, enclosed space for space for children. Leading into the garden on either side of the stone walkway are two welcoming living walls covered in different species of sedum.

Circle Garden

The Circle Garden is a display garden for unusual combinations of annuals, which are changed out each season. Trees, shrubs, and perennials are also part of the garden, providing an attractive backdrop to the changing display of showy annuals, and extending the beauty of the garden through winter. The seasonal display begins with spring bulbs coupled with their cool-season companions and ends in October, with towers of mums enhancing the hot-season annual plants.

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Kleinman Family Cove

The Kleinman Family Cove is a 1.25-mile section of shoreline that contains some of the 120,000 aquatic and emergent plants installed along the 81 acres of lakes and waterways at the Chicago Botanic Garden. Located on the Garden's North Lake, it features a boardwalk, amphitheater, protected wading area, and native plants. Well-represented genera in this garden include *Acorus*, *Baptisia*, *Carex*, *Cornus*, *Geranium*, *Hamamelis*, *Rudbeckia*, *Vernonia*, and *Viburnum*.

Students explore the small bay, use nets to analyze aquatic animal life, assess water quality, and discover why water is important to human health. The demonstration garden showcases the importance of shoreline management. Interpretive signage guides visitors to observe and understand aquatic wildlife and habitat.

Crescent Garden

Both the Crescent and the Heritage Garden share a similar design scheme of crescent-shaped beds filled with seasonal plants. Hardy trees and shrubs give the garden a sense of permanence and form. Weeping willows, green pillows of cloud-pruned boxwoods, and the fastigate beech trees are featured prominently. Springtime in the Crescent blooms with color blocks of thousands of tulips, while autumn consists of colorful fall displays.

The prominent features of the Crescent garden are its annual beds, while hundreds of evergreen boxwoods give shape to their curves. The evergreens create a mass of green "steps" flanking the eight concentric tiers, which increase in size as they slope gently down to the water's edge. Brick walkways lace through the beds, encouraging visitors to step close to the plants.

Dwarf Conifer Garden

The Dwarf Conifer Garden showcases the diversity of forms and habits available with dwarf conifers along with a variety of perennials. The garden serves as a resource for homeowners, allowing them to see what a wide variety of the most common dwarf conifers will look like in the landscape, while also serving to educate visitors who haven't encountered them before.

The Dwarf Conifer Garden contains 230 unique taxa of conifers distributed across 19 genera. The most well-represented genera are *Juniperus*, *Picea*, *Chamaecyparis*, *Pinus*, *Taxus*, and *Thuja*. To aesthetically complement the conifer collection, this display also includes approximately 160 other taxa, including spring bulbs like *Anemone* and *Narcissus*, herbaceous plants like *Sedum*, *Veronica*, and *Geranium*, and other non-coniferous trees, shrubs, and vines like *Fagus sylvatica* cultivars, *Sorbus americana*, *Chionanthus retusus*, and *Actinidia kolomikta*, to name a few.

Buehler Enabling Garden

The Buehler Enabling Garden is a hands-on teaching garden that encourages gardening for people of all ages and abilities. Raised beds of annuals, container gardens, adaptive tool

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displays, and model exhibits illustrate gardening techniques that can be used to make gardening accessible to everyone. Water is used throughout the garden, in shooting fountains, cascading sheets, and cooling pools. Vertical gardens, sensory plants, and smooth brick pathways are all elements in accessible gardens. Several dwarf conifer varieties adorn the low knee walls including *Sciadopytis verticillata* 'Joe Kozey' and *Pinus mugo* 'Gnom'.

English Oak Meadow

The English Oak Meadow is a seasonally-changing planting of bulbs, annual flowers, and hardy shrubs set amid several varieties of oaks including *Quercus robur* 'Purpurascens' and *Quercus dentata*. This hillside meadow is awash with color from spring through fall.

English Walled Garden

The English Walled Garden was designed by renowned English landscape architect John Brookes, Member of the British Empire (MBE). This garden comprises six unique garden rooms featuring different elements of English garden design, and its collections focus primarily on plants commonly used in English gardens. For example: the Cottage Garden highlights fruits, vegetables, herbs, and cut flowers; the Pergola Garden has large specimens of *Wisteria*, and complementary flowers and foliage in blues, purples, and silver. The English Walled Garden has been updated periodically. Enhancements are made in consultation with Brookes, and a restoration project is underway that includes a plan to rethink the plantings and overhaul the perennial borders. Several genera are well-represented throughout the garden, including 17 taxa of *Rosa*, 36 taxa of *Clematis*, and 17 taxa of *Geranium*.

Esplanade

The Esplanade contains an allée of 36 *Ulmus* 'Morton Stalwart' COMMENDATION™ and a pavilion lined with sheared cone topiaries of *Taxus cuspidata* 'Tvrudy.' The garden was conceived by Dan Kiley (1912-2004), and designed by Peter Morrow Meyer, and was conceived as one of the Chicago Botanic Garden's most public spaces, bringing visitors down to the water in a most inviting way. The Esplanade also features formal displays of cultivars of *Rosa*, *Salix*, *Stephanandra*, *Spiraea*, and *Cotoneaster*.

Evening Island

Evening Island comprises five acres of hillside, woodland, and meadow gardens. Evening Island is an example of the New American Garden style of landscape design, which features vast naturalistic sweeps of low-maintenance grasses, perennials, and roses. The garden is sited, appropriately, between the formality of the English Walled Garden and the wildness of the native Prairie.

Prominent taxa include spring bulbs (*Tulipa*, *Scilla*, *Narcissus*, and *Camassia*), as well as large sweeps of both species and cultivars of *Alchemilla*, *Allium*, *Amsonia*, *Calamagrostis*, *Carex*,

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Epimedium, *Hakonechloa*, *Hemerocallis*, *Hosta*, *Panicum*, *Perovskia*, and *Persicaria*, to name just a few of the 127 genera represented on Evening Island.

Regenstein Fruit and Vegetable Garden

The Regenstein Fruit and Vegetable Garden demonstrates appropriate examples of fruits, vegetables, herbs, and nut trees that exhibit good pest and disease resistance, have good eating qualities, and are well-suited for the Chicago area, as well as proper cultural techniques for visitors interested in growing food plants at home.

The collections of the Regenstein Fruit and Vegetable Garden contain over 400 varieties, including edible and medicinal herbs, apples, pears, peaches, cane fruits, blueberries, grapes, strawberries, vegetables, as well as more unusual crops such as elderberries, hardy kiwis, and nut-producing trees like walnuts, hickories, and pecans. 33 taxa of *Malus* are maintained in the garden in the orchard and espalier collection.

Greenhouses

The Greenhouse Collections provide visitors with a comfortable environment in which to view and interact with plants year-round. The Greenhouse Collections are housed in three glasshouses with distinct microclimates: an arid greenhouse, a semitropical greenhouse, and a tropical greenhouse. In total, the three greenhouses are home to over 1,000 unique taxa. The greenhouses are home to many nationally and internationally threatened or endangered species. The Chicago Botanic Garden helps to regulate the trafficking of these plants through cooperation with the United States Fish and Wildlife Service, the Convention on International Trade of Endangered Species of Wild Fauna and Flora, and the International Union for the Conservation of Nature. Relationships with these organizations have led to new acquisitions of conservation-relevant flora through plant rescue programs.

The arid greenhouse collection displays succulents, cacti, and dryland trees, shrubs, and forbs from arid, desert, or dryland climates. There are over 400 taxa in this collection, representing 35 families. The most prominent families represented are the Cactaceae, Crassulaceae, Euphorbiaceae, and Xanthorrhoeaceae. Species and cultivars in these four families contribute to a significant winter bloom event in this greenhouse, with vivid *Aloe* and *Bulbine* species and cultivars blooming alongside *Echinopsis*, *Ferocactus*, and *Mammillaria* cacti. Yellow-flowered *Acacia*, *Caesalpinia*, and *Senna* tree species are another seasonal highlight.

The semitropical greenhouse collection is home to 160 unique taxa from regions of the world with a semitropical climate, and can provide inspiration to visitors looking for new cultivars or species to grow indoors. The best-represented families in this greenhouse are the Lamiaceae, Acanthaceae, and Asparagaceae, of the 85 families represented. There is a noteworthy collection of 20 *Sarracenia* and *Nepenthes* cultivars and species in a bog garden display. This greenhouse is also used for a seasonal display of *Amorphophallus titanum*, when in bloom.

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The tropical greenhouse is the most diverse of the three, and also houses the largest collection. There are nearly 500 unique taxa from over 50 families. Perhaps the best known representative family in the tropical house is the Orchidaceae. There are nearly 200 species and cultivars of orchids on display in the tropical greenhouse, featured in the Chicago Botanic Garden's orchid show every spring. There are also diverse collections in the Bromeliaceae, Araceae, and Zingiberaceae families in this greenhouse. Epiphytic *Tillandsia*, *Aechmea*, and *Vriesea* are displayed on trees alongside orchids, with climbing aroids, like *Philodendron* and *Monstera* and terrestrial ginger, like *Alpinia*, *Curcuma*, *Hedychium*, and *Zingiber*, planted throughout.

Heritage Garden

The Heritage Garden is modeled after and inspired by the first botanic garden in Padua, Italy. It serves as an educational and scientific demonstration of taxonomic characteristics of plant families, with a strong emphasis on vibrant seasonal displays that somewhat vary from year-to-year to express the wide variety of plants in the wild and under cultivation.

There are 21 beds in total in the Heritage Garden. Seven perimeter beds display taxa according to their geographic origin: Africa, Asia, Australia, Europe, Japan, North America, and South America. The other 14 beds represent plant families and taxonomic groups: *Asteraceae*, *Boraginaceae*, *Fabaceae*, *Iridaceae*, *Lamiaceae*, *Liliaceae*, *Pinaceae*, *Poaceae*, Pteridophyta, *Ranunculaceae*, *Rosaceae*, *Scrophulariaceae*, *Solanaceae*, and *Verbenaceae*. These taxonomic beds are ordered using the Englerian system: Ferns and fern allies; Monocots; Dicots with separate petals; and Dicots with fused or tubular petals. There has been much discussion about the fluid nature of genera in each plant family, which makes it difficult to keep the family beds completely true-to-family. We are generally taking a historical view of plant family genera where it makes sense (e.g. *Hosta* historically has been in *Liliaceae*, but is not the case currently. Nonetheless, we still show *Hosta* in the *Liliaceae* family).

The Physic Bed is a study of plants that have, or had, medicinal purposes. The original botanic gardens were extensively used by physicians to study plants for this purpose, and this bed pays homage to that purpose. A few of the genera displayed in the Physic Bed are *Achillea*, *Allium*, *Baptisia*, *Echinacea*, *Hypericum*, and *Salvia*.

The Linnaeus Meadow is an artistic juxtaposition between the "chaos" in the plant world before Linnaeus did his work, and what existed after. The Linnaeus Meadow is thus intentionally curated but chaotic when contrasted with the strict organization of the rest of Heritage. The meadow contains 92 unique taxa distributed across 62 genera. Highlights include sweeps of *Cornus sericea*, *Perovskia atriplicifolia*, and *Thymus praecox* cultivars, as well as mixed plantings of *Lathyrus*, *Hypericum*, *Eupatorium*, and *Spiraea* species, and spring bulb displays of *Allium moly* and *Anemone* cultivars.

The *Taxodium distichum* hedge is our representation of the actual wall that surrounds the Padua garden. The *Thuja occidentalis* 'Pyramidalis' at the north entrance of Heritage are intended to represent Italian cypress that we would also find in the Padua garden. The *Malus*

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sargentii at the north and south entrance are pruned to an umbrella shape, with each pair matching as best as possible, as with the matching pairs of *Cornus mas* trees.

Elizabeth Hubert Malott Japanese Garden

The 17-acre lakeside Elizabeth Hubert Malott Japanese Garden includes three islands. Only two—Seifuto (Island of Clear, Pure Breezes) and Keiunto (Island of the Auspicious Cloud)—are open to the public. Across the lake, the inaccessible island Horaijima (Island of Everlasting Happiness) is symbolic of paradise. The design features plants commonly used in Japanese garden design, including 23 species and cultivars of *Acer*, 14 species and cultivars of *Pinus* pruned and trained to give the illusion of age, and roughly 17 taxa each of *Prunus* and *Rhododendrons*, among other trees and shrubs. Ground layers are also planted in a Japanese style with large sweeps of moss, and naturalistic plantings of ferns and perennials like *Athyrium*, *Dennstaedtia*, *Hosta*, *Iris*, *Liriope*, *Muhlenbergia*, *Pachysandra*, and *Sedum*.

Lakeside Gardens

The Lakeside Gardens are naturalistic in style and contain both sun and shade plantings. The gardens include creative combinations of perennials, aquatic plants, ground covers, grasses, trees, and shrubs. The May bloom of 300 crabapple trees is a stunning feature of this garden.

Mass succession plantings of aquatic and semiaquatic native plants, perennials, ornamental grasses, irises, and roses guarantee color throughout all seasons. These plants were chosen for their ease of management and their adaptability to shoreline challenges and water fluctuations.

Farwell Landscape Garden

The Farwell Landscape Garden displays a cross section of different kinds of gardens suitable for residential settings, and the plants appropriate to these designs. Specialized garden displays include formal and informal herb gardens, a traditional perennial border, a rock garden, streamside gardens, an easy-to-grow mixed border, and other small-scale landscaping ideas for Midwest gardens, both sun and shade.

Model Railroad Garden

The 7,500-square-foot Model Railroad Garden features trains running on 1,600 feet of track. The garden-scale trains are 1/29th the size of life-size trains. All tunnels, bridges, and buildings are intricately handcrafted with natural materials, including twigs, bark, leaves, acorns, and pebbles. More than 5,000 tiny and dwarf trees, shrubs, ground covers, and flowering plants of close to 300 varieties re-create the topographical landscape of America.

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Native Plant Garden

The Native Plant Garden displays three distinct areas — a woodland garden with native plants preferring part shade, a prairie garden showcasing sun-loving native prairie plants, and a habitat garden designed to appeal to birds and butterflies.

The woodland garden displays native plants that prefer part shade, with an overstory of shagbark hickory, American hop hornbeam, and swamp white oak. The shrub layer includes witch hazel, spicebush, buttonbush, and native raspberry. A few of the perennials and spring ephemerals include wild ginger, Christmas fern, and red and yellow trillium.

The prairie garden was designed with low-growing plants in front and taller ones in back to allow visitors to "look through" the entire community of plants. This garden blooms first with shooting star and prairie smoke, followed by short grasses and perennials such as wild indigo, early coreopsis, wild petunia, and little bluestem. Last to bloom are gentian, flowering spurge, butterfly weed, and the tall grasses. The grasses and wildflowers growing here are all suitable plants for backyard naturalistic gardens. The grasses have an added benefit of attracting birds to feast on the mature seedheads in fall.

The habitat garden, with birdhouses, feeders, and statuary, showcases native plants that will encourage birds and butterflies to frequent your yard. In addition to forbs and grasses, many shrubs or vines with berries are also attractive to wildlife. Rose, hawthorn, bittersweet, winterberry, chokeberry, and serviceberry provide food sources and nesting sites for birds.

This garden is an official demonstration site for Chicago Wilderness.

Nature Play Garden

The Nature Play Garden features a series of multisensory areas. It has sugar maple, aspen, and redbud groves and an expansive lawn that has a runnel, rolling hills, a willow tunnel, boulders for climbing, and natural "rooms" defined by arborvitae and hornbeams. Renowned landscape designer Mikyoung Kim provided the concept vision for the Nature Play Garden; Terry Ryan of Jacobs/Ryan Associates adapted the design, which incorporates native plants. Horticulturists selected the garden's flowers and trees for qualities such as color, scent, texture, and even sound (the sweetgums trees have seedpods that rattle); more than half of the perennials are new to the Chicago Botanic Garden.

Krasberg Rose Garden

The Krasberg Rose Garden features a collection of over 200 cultivars and species of roses that are appropriate for the Midwest garden. This collection includes tried and true favorites, as well as a collection of "old-fashioned roses." There is an emphasis on fragrance when possible, without sacrificing the primary objective that the roses must perform well in this region.

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The Rose Garden also features perennial and other woody plants that either complement the roses or provide some interest all year long. For these plants, it is largely a garden of repetition, using cultivars of seven species and hybrids of *Viburnum*, an allée of *Tilia cordata* ‘Greenspire,’ and cultivars of *Thuja plicata*, *Thuja occidentalis*, and *Juniperus x pfitzeriana*. There are also plantings of choice cultivars of *Clematis*, *Buxus*, and *Paeonia*, to name a few, throughout.

Sensory Garden

The sensory garden features plants in raised beds, making them easy to smell and touch for people with limited mobility and others. Plants chosen for texture include purple coneflower (*Echinacea purpurea*) and the soft-foliaged silver sage (*Salvia argentea*). Plants chosen for their scent include the sweetbriar rose (*Rosa rubiginosa*) with fragrant leaves that smell like apples, and dark-maroon colored chocolate cosmos (*Cosmos atrosanguineus*). The color combinations—yellow, red, and orange—are intended to be warm and inviting.

Spider Island

Though small, Spider Island was designed to create the experience of being in a much larger, more secluded woodland. Spider Island is the smallest of the nine islands of the Chicago Botanic Garden. The garden features *Betula* as an overstory, *Cornus* and *Salix* along the shoreline, along with other shrubs, ferns, grasses, sedges (3,500 individuals, 8 taxa), and flowering perennials like *Aconitum*, *Baptisia*, *Brunnera*, *Camassia*, *Dicentra*, *Epimedium*, *Geranium*, *Iris*, *Podophyllum*, *Rodgersia*, and *Sagittaria*, among many others. Among the first to bloom on Spider Island are bluebells (*Hyacinthoides non-scripta*); among the last is hairy toad lily (*Tricyrtis hirta* ‘Moonlight’).

Waterfall Garden

The Waterfall Garden provides a unique setting to demonstrate the seasonal adaptation of more than 15,000 plants and trees. A 45-foot waterfall cascades down a hillside into a series of small landscaped pools. The steep slopes offer plant material perfect drainage, and the trees and shrubs lining the stepped paths recall those of a mountainous stream. Shade-loving perennials accompany pendulous plants, weeping conifers, and other plants displaying cascading habits. The top of the garden affords beautiful views across the lake. Waterfall Garden is a diversely planted area featuring over 600 accessions and 338 distinct taxa.

West Collections

The West Collections area of the Garden is planted in predominantly woody species in an arboretum style. Large masses of trees and shrubs are planted throughout the area along the Skokie River. The West Collections are home to nearly 500 species and cultivars of woody trees and shrubs distributed throughout 80 genera. The most prominent genera on display in the West Collections are plantings of *Hydrangea*, *Salix*, *Acer*, *Quercus*, and *Cornus*, with large sweeps of 19 *Narcissus* cultivars for spring display.

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Taxonomic Collections

The Chicago Botanic Garden also holds specialty taxonomic and geographic collections. These collections focus on plants that belong to a specific order, family, genus, or world climatic region. The purpose of these collections is to showcase plant diversity, educate visitors about plant taxonomy, and support conservation by holding *ex situ* collections of taxonomic groups.

New acquisitions will also go towards expanding existing collections that are well-suited to the garden's soil type and microclimate. Some genera that have been targeted as a priority for expansion are *Carex*, hardy *Actinidia*, non-bracted *Cornus*, trumpet-type *Narcissus*, *Populus*, *Viburnum*, *Physocarpus*, *Hydrangea* and *Amelanchier*. Adding to these genera will keep the garden's collections current, increase diversity in the collections, and provide greater opportunities for teaching, engaging with visitors, research, and conservation.

Plant Collections Network (PCN) Collections

As a long-term collaboration between the American Public Garden Association and the United States Department of Agriculture – Agriculture Research Service, the Plant Collections Network (PCN) is a coordinated effort of germplasm preservation and collections management strategies. The Garden currently holds PCN Nationally Accredited Collections of *Geranium* (over 160 identified taxa, including 118 cultivars), *Spiraea* (27 species and 49 cultivars), and *Baptisia* (23 species and 57 cultivars) collections, and is a multisite host, collaborating with 19 other botanical institutions, for the nationally recognized *Quercus* collection. The Garden is committed to supporting this program through continued collections growth and the application for accredited collections.

Zingiberaceae

This collection is housed primarily in the tropical and semitropical greenhouses, but there are some unusual specimens planted elsewhere, like the semi-hardy *Zingiber mioga* in the Graham Bulb Garden, and the edible spice cardamom, *Elettaria cardamomum*, planted in the Regenstein Fruit and Vegetable Garden. The collection contains 75 unique species and cultivars comprising ten genera: *Alpinia*, *Boesenbergia*, *Burbridgea*, *Curcuma*, *Elettaria*, *Globba*, *Hedychium*, *Kaempferia*, *Stahlianthus*, and the familiar *Zingiber*.

Tropical Araceae

The aroid collection comprises 100 taxa distributed across 23 genera. This collection includes hardy taxa like *Pinellia* and Midwestern natives *Arisaema* and *Symplocarpus*, important food crops like *Alocasia* and *Colocasia*, and iconic curiosities like the titan arum, *Amorphophallus titanum*. 89 species of *Amorphophallus* are currently in the collection. The garden now has a significant collection of *A. titanum*, which draw large crowds when a specimen is in bloom. These specimens serve as unique educational opportunities to connect visitors to scientific research, and serve as *ex situ* conservation collections and sources of germplasm to be exchanged with other institutions.

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Salix

The Garden features a uniquely large collection of *Salix*, with 142 total taxa, 63 of which are cultivars, spread over 255 accessions and 8,072 individual plants. The goal of this collection is to acquire through collecting all native Illinois species and hybrids of *Salix* (20) with known provenance. Although there are currently 853 cultivars of willow listed in the Checklist of Cultivars of *Salix*, it would be unreasonable for one institution to hold every known cultivar due to space and accessibility constraints. The Garden is committed to holding up to 250 taxa of *Salix*.

Viburnum

The taxonomic scope of the *Viburnum* collection includes species, cultivars, and hybrids hardy in the upper Midwest, with 173 taxa, 128 of which are cultivars, spread over 521 accessions and 3,390 individual plants. This collection is one of the most diverse collections of *Viburnum* in North America. Many of the plants are displayed in landscape settings, and *Viburnum* are found throughout the Garden. The soil replicates that found in many urban and residential spaces – a compacted clay base with minimal topsoil.

Carex

The Garden also has a significant collection of *Carex* species and cultivars. There are 1,189 accessions and 128,204 living plants within the genus in both cultivated gardens and natural areas. There are 109 total unique taxa, and 89 species and infraspecific taxa. These species and cultivars contain taxa that are appropriate for a variety of cultural conditions, ecological restoration projects, and naturalistic landscapes. For some perspective, there are approximately 130 species of *Carex* native to Illinois. The Garden is committed to expanding and maintaining its *Carex* collection for the purposes of restoration, research, and display.

Gesneriads

There are 321 accessions in the Gesneriaceae family, most of which are housed in the Semitropical and Tropical Greenhouses, or held in production nurseries and used for seasonal displays. Those accessions contain 579 living plants, in genera such as *Achimenes*, *Aeschynanthus*, *Columnea*, *Episcia*, *Kohleria*, *Nematanthus*, *Primulina*, *Sinningia*, and *Streptocarpus*. The Garden's collection of *Episcia* is particularly large, with 318 individuals representing 20 cultivars and four species.

Succulents

The succulent collection is housed in many display and evaluation areas throughout the Garden, but most prominently featured in the Arid Greenhouse. There are over 700 accessions spread across multiple families. These accessions include those more commonly associated with succulent collections (Cactaceae, Aizoaceae, Crassulaceae, Euphorbiaceae, Xanthorrhoeaceae),

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but also with some less common specimens of succulents from families like Apocynaceae (*Hoya*, caudiciforms like *Pachypodium*, and *Stapelia*), Welwitschiaceae (*Welwitschia*), Araliaceae (*Cussonia paniculata*), Burseraceae (*Bursera fagaroides*), and Campanulaceae (the endangered *Brighamia insignis*). This collection, in total, contains more than 40,000 individual plants and over 400 species and cultivars.

Southern Hemisphere Bulbs

This collection contains 270 unique taxa, 80 genera, and 15 families. By far, the best represented families in the collection are Amaryllidaceae, Asparagaceae, and Iridaceae, both in terms of quantity of specimens and numbers of unique taxa. The collection contains common and uncommon genera from South Africa, such as *Ixia*, *Crossyne*, *Pauridia*, and *Spiloxene*, South America, such as *Zoellnerallium*, *Pasithea*, and *Bomarea*, and New Zealand, such as *Oxalis massoniana*.

Begonia

The Begonia collection consists of 83 taxa and 95 total accessions. Although many of the Begonia species and cultivars are planted throughout Garden areas, the majority of the collection is not hardy in Chicago's climate. Consisting of cane, semi-tuberous, tuberous, and *Begonia rex-cultorum* types, the bulk of the collection is housed in the production greenhouses.

Pelargonium

Members of the *Geraniaceae* family, the genus *Pelargonium* consists of non-hardy perennials primarily grown for their floral display. Grown for their floral characteristics, the collection resides in the production greenhouses and is used for seasonal displays. 37 unique taxa and 41 accessions of *Pelargonium* make up our collection.

Bromeliads

Bromeliads make up the large taxonomic group of basal monocots within the *Bromeliaceae* family, consisting of 51 genera and almost 3500 species. The Garden's collection of bromeliads are used in the Greenhouses, and are kept in the production greenhouses when not in use. 18 separate genera are represented in the collection with a total of 85 distinct taxa.

Geographic Collections

The Chicago Botanic Garden also has specialty collections with a focus on geographic regions or climatic zones

Heritage

There are 21 beds in total in the Heritage Garden. Seven perimeter beds display taxa according to their geographic origin: Africa, Asia, Australia, Europe, Japan, North America, and South

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America. Each bed features hardy trees, perennials, and shrubs from each region, if available, and temperate collections if not (particularly for the Australia, South America, and Africa beds).

The South America bed features tropical forbs like *Asclepias*, *Nicotiana*, and *Alpinia*, trees like *Psidium littorale*, and tropical vines like *Ipomoea* and *Tropaeolum*. Other highlights include: *Eryngium variifolium*, *Carissa macrocarpa*, and *Dietes grandiflora* in the Africa bed; *Callistemon citrinus* in the Australia bed; *Clematis heracleifolia*, *Sanguisorba tenuifolia*, *Corydalis elata*, and *Sophora davidii* in the Asia bed; *Narcissus* cultivars, *Achillea*, *Malva*, *Thalictrum*, and *Centaurea* in the Europe bed; *Acer palmatum* 'Groundcover,' *Geranium pretense*, and *Lycoris squamigera* in the Japan bed; and cultivars of *Erythronium*, *Camassia*, and *Iris*, along with *Mertensia virginica*, *Trillium recurvatum*, and *Ruellia humilis* in the North America bed.

Trees of Illinois

The Trees of Illinois collection is a naturalistic display garden featuring 134 species and cultivars of trees, shrubs, and forbs native to Illinois. This collection contains 9,141 individual plants, and extensive collections of native trees like *Acer*, *Aesculus*, *Alnus*, *Amelanchier*, *Aronia*, *Betula*, *Carya*, *Catalpa*, *Chamaecyparis*, *Cladrastis*, *Cornus*, *Crataegus*, *Fraxinus*, *Gymnocladus*, *Juglans*, *Larix*, *Liriodendron*, *Nyssa*, *Pinus*, *Populus*, *Quercus*, *Salix*, *Ulmus*, and *Viburnum*.

Plant Exploration Organizations

North America-China Plant Exploration Consortium (NACPEC)

Beginning in 1991, the North American-China Plant Exploration Consortium is a collaborative group of organizations committed to the *ex situ* conservation of plants throughout China. The current member institutions of NACPEC are: Chicago Botanic Garden, Morris Arboretum, the Morton Arboretum, U.S. National Arboretum, Dawes Arboretum, Holden Arboretum, Longwood Gardens, Arnold Arboretum, and University of British Columbia Botanical Garden.

As a member institution, the Garden will continue to take part in targeted collections trip throughout the region. The Garden will also collect and maintain distributed plants from NACPEC collections trips.

Plant Collecting Collaborative (PCC)

The Plant Collecting Collaborative is a group of fourteen arboreta and botanic gardens dedicated to the collection and conservation of wild-collected germplasm from both USDA zone 6 hardy areas and sub-tropical/tropical regions. The current member institutions are: Chicago Botanic Garden, The Morton Arboretum, Minnesota Landscape Arboretum, New York Botanic Garden, Greater Des Moines Botanical Garden, Cornell Botanic Garden, Denver Botanic Garden, Moore Farms Botanical Garden, U. S. National Arboretum, Arnold Arboretum, Polly Hill Arboretum, Longwood Gardens, Morris Arboretum, United States Botanic Garden, and Bartlett Tree Research Laboratory and Arboretum.

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2) Research Collections

The research collections vary according to the areas of specialization of curatorial, horticultural and scientific staff. They exist for the life of the research project or breeding program.

Bernice E. Lavin Plant Evaluation Garden

The Lavin Evaluation Garden evaluates herbaceous and woody plants in comparative trials, ultimately recommending the top performers to gardeners and the horticulture industry. The garden itself is a 2.5-acre site with uniform growing conditions, which include full sun and exposure to wind in all directions. Evaluation studies are conducted over four years for perennials, six years for shrubs and vines, and seven to ten years for trees.

The goal of the Lavin Plant Evaluation Garden is to determine, through scientific evaluation, which plants are superior for gardens in the Upper Midwest. Plants are rated on ornamental qualities, cultural adaptability, winter hardiness, and disease and pest resistance. It is the intent of the program to study and recommend plants that are readily available in area nurseries. Study results are published and reported to both the professional industry and the gardening public.

Recent notable trials include *Andropogon* (bluestem), *Asclepias* (milkweed), *Baptisia* (false indigo), *Chrysanthemum* (hardy mum), *Coreopsis* (tickseed), *Filipendula* (meadowsweet), *Hamamelis* (witch hazel), *Helenium* (sneezeweed), *Hibiscus* (rose mallow), *Hydrangea paniculata* (panicle hydrangea), *Hydrangea serrata* (Japanese hydrangea), *Lespedeza* (bush clover), *Molinia* (purple moor grass), *Perovskia* (Russian sage), *Persicaria* (smartweed), *Potentilla* (perennial cinquefoil), *Salvia* (hardy and non-hardy sage), and *Schizachyrium* (little bluestem).

Plant Breeding

The plant breeding program at the Chicago Botanic Garden is intended to promote the use of new perennial plant cultivars that are well-adapted to the growing conditions of the Upper Midwest. While regional in focus, the program's plants can be grown successfully in all zone-appropriate regions of North America, Europe, and around the world.

Research conducted under the plant breeding program has resulted in the introduction of new cultivars of trees, perennials, shrubs, and grasses. Among the genera that have undergone successful research trials are *Baptisia*, *Phlox*, and *Echinacea*. Current trials include additional *Phlox* hybrids, *Symphyotrichum*, *Veronica*, and *Vernonia*, among others. The Garden conducts breeding and introduction of herbaceous plants through the Chicagoland Grows organization; a partnership between the Chicago Botanic Garden, the Morton Arboretum, and Ornamental Grower's Association of Northern Illinois.

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Plant Science Center Green Roof Garden

The Plant Science Center features a green roof garden that serves as a living laboratory. In addition to being the subject of research by Garden scientists, the Green Roof Garden functions as an outdoor classroom to thousands of Garden visitors annually. The 16,000-square-foot green roof is accessible to the public via a grand staircase. An overlook with interpretive panels educates visitors about all aspects of rooftop gardens.

Two distinct areas serve specific functions: the Ellis Goodman Family Foundation Green Roof Garden South features regional and national native plants, many of which are not currently used as rooftop plants; the Josephine P. & John J. Louis Foundation Green Roof Garden North features a mix of plants known as good green roof plants, plus native and exotic plants that have potential for green roof use. Generally, the plants are sun loving, drought tolerant, have a shallow root system, and can withstand windy conditions. Some of the plants that performed best from both rooftop trial gardens include *Amorpha canescens*, *Helianthus mollis*, *Juniperus chinensis* var. *sargentii*, *Penstemon hirsutus*, *Potentilla arguta*, *Sedum kamtschaticum* ssp. *ellacombianum*, and *Viola sagittata*. Results from these green roof evaluations should help expand the list of species being used in green roof plantings in North America.

Rice Plant Evaluation Garden

The Rice Plant Evaluation Garden is in Skokie, Illinois near the Rice Foundation headquarters. The garden is divided into nine raised beds consisting of specific soil types not present at the Garden. Sand, clay, humus, and acidic soil types are present in these beds, and wild-collected plants with specific soil requirements are planted accordingly. This garden area allows for the conservation, evaluation, and propagation of wild-collected germplasm outside of the Garden's limited soil conditions.

Rose Evaluation

The rose evaluation garden area is located along the eastern edge of the lagoon and consists of landscape beds which were excavated to 12 inches and then replaced to a raised height of 6 inches above grade. A clay loam mix with an approximate pH of 7.4 was used in these beds to evaluate the performance of shrub roses in our climatic conditions. Plants are evaluated for winter hardiness, disease and insect resistance, flower color/size, bloom period and coverage, plant form, and overall health. Both rose species and new cultivars are evaluated over a period of six years.

3) Conservation and Science Collections

Rare Species Conservation Collections

The Garden houses collections of rare and endangered species, some originating in local ecosystems, others serving as *ex situ* collections of species from elsewhere in the world. These collections serve as possible sources of reintroduction material, and are used by staff scientists

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to better understand the threats facing these species in the wild. These collections include *Cirsium pitcheri*, an endangered thistle endemic to the Great Lakes region, *Brighamia insignis*, an endangered Hawaiian lobelioid endemic to Kauai, and *Oenothera organensis*, a rare, range-limited evening primrose species descended from a collection made in 1938.

Dixon Tallgrass Prairie Seedbank

The Dixon National Tallgrass Prairie Seed Bank, a conservation project at the Chicago Botanic Garden, aims to collect and store, or bank, the seeds of tallgrass prairie region flora. The goal of the seed banking project is global in scope. The Dixon National Tallgrass Prairie Seed Bank, in association with the national Seeds of Success (SOS) program, is part of an international seed conservation initiative collectively known as the Millennium Seed Bank Project (MSBP), originally developed by the Royal Botanic Gardens, Kew, in the United Kingdom. This global program aims to bank 10 percent of the world's flora by 2010 for long-term storage and conservation. The Dixon Tallgrass Prairie Seedbank currently holds over 3,300 accessions of 1,479 species. Genera native to the tallgrass prairie region such as *Symphyotrichum*, *Veronica*, and *Liatris* are conserved in this collection.

Nancy Poole Rich Herbarium

The Nancy Poole Rich Herbarium currently houses nearly 20,000 specimens, and is continually growing. Some of the collections represented include flora of Cook County, Illinois; flora of the tallgrass prairie (including vouchers from Dixon National Tallgrass Prairie Seed Bank); foreign and domestic plant collecting expeditions; and collections from conservation research carried out by scientists at the Garden. New taxa accessioned into the living collections are vouchered and added to the herbarium to maximize representation of horticultural and wild species.

An herbarium is a museum of dried preserved plants and fungi that are valuable for scientific research. Herbaria around the world provide a scientific record of the earth's flora. The specimens housed in herbaria can be used for research in fields as diverse as systematics, restoration, invasive species, genetics, medicinal research, and historic climate change. A typical herbarium specimen consists of a dried and pressed plant affixed to a sheet of archival paper and a label providing descriptive information, including the scientific name, the date and locality of collection, collector name, as well as additional data. For each collection in the Science Collections Database, herbarium data are linked with data from the Garden's Dixon National Tallgrass Prairie Seed Bank and DNA Repository.

All accessions in the Nancy Poole Rich Herbarium are digitized and available online. This offers scientists, citizen scientists, educators, and others electronic access to herbarium specimens via the Science Collections Database, thus allowing for the advancement of research and education while preserving the physical specimens.

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DNA Repository

The Chicago Botanic Garden's DNA Repository offers scientists, students, and other researchers year-round access to leaf tissue and extracted plant DNA. The Garden's Science Collections Database allows interested parties to search for available specimens among thousands of available species. Each listing in the database merges information from the Nancy Poole Rich Herbarium, Dixon National Tallgrass Prairie Seed Bank, and DNA Repository into one listing per species. Most records are of plant species and cultivars grown at the Chicago Botanic Garden, with the remaining coming from species collected locally or regionally in the United States, including a number that are rare or endangered, and vouchers from species studied by Chicago Botanic Garden scientists. The Garden is also a founding member of the Global Genome Initiative, working to preserve the genomic diversity of life on Earth.

In most cases, a collection consists of samples from a single individual specimen that was collected at single location. In some cases, research collections have multiple samples from a single population. DNA samples are stored at the Garden in a range of conditions, which vary due to the variety of sources of the material. Frozen fresh leaf material and dried samples are stored at -20 degrees Celsius. Extracted DNA is stored in an ultra-cold freezer at -80 degrees Celsius. As of 2018 there are 5,177 species and cultivars represented in DNA storage.

Garden scientists rely on DNA analysis to studying taxonomic relationships among plants because DNA is relatively immune to environmental extremes that sometimes impact the size and shape of plants. It also contains fragments that scientists can use to deduce the ancestral origins of plant taxonomic groups. Statistical analysis of DNA results has identified the rate at which certain types of mutations occur, providing some insight into when each genetic lineage branched off from its closest relatives. Garden scientists also work with genetic plant information to study paternity, genetic fingerprinting, gene flow, and DNA sequencing, and use that information for research in fields as diverse as systematics, restoration, invasive species, genetics, medicinal research, and historic climate change.

Dixon Prairie

The Dixon Prairie celebrates the natural heritage of Illinois with a re-creation of six prairie types that once were common in the Midwest. The six types represented are wet fen, gravel hill prairie, mesic prairie, sand prairie, and savanna. The 15-acre site features more than 250 species of native plants on an open, rolling landscape surrounded by water. The Dixon Prairie is part of the Chicago Botanic Garden's larger plan to preserve and protect native plants, as well as grassland restorations and creations in the Midwest.

McDonald Woods

McDonald Woods is a 100-acre parcel of oak-hickory-maple woodland and savanna on a glacial ridge. In an ongoing effort to protect and restore the woods, Chicago Botanic Garden ecologists and volunteers remove invasive species such as buckthorn and garlic mustard. They also collect and scatter the seeds of native grasses, sedges, and wildflowers. The Woods is home to at least

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seven state-listed threatened or endangered plant species—northern cranesbill, forked aster, dwarf raspberry, bent-seeded hop sedge, brome hummock sedge, small sundrops, and dog violet—and is a site of critical scientific research on endangered species and habitat restoration.

Skokie River

The one-mile stretch of the Skokie River, which runs through the Chicago Botanic Garden, is maintained as a natural area and a demonstration site offering natural methods to enhance urban waterways. The Garden works to enhance part of the stream channel that flows through the Garden's western perimeter to develop habitat, increase biodiversity, and improve water quality, while at the same time showcasing river enhancement techniques and serving as a living laboratory to study human-built riparian corridors. Twenty-two acres adjacent to the river have been devoted to this effort.

Portions of eroded stream banks have been bolstered with woody plants. Along the river, floodplain wetlands, upland prairie, and oak savanna-woodland also are being established. Approximately 200 species of native herbaceous plants are thriving. Fast-growing species such as cottonwoods (*Populus deltoides*), along with remnant Garden horticulture trees, form a woody backdrop on the Garden's western edge as slow-growing oaks—primarily bur oak (*Quercus macrocarpa*)—reach maturity. In the river's floodplain, Garden scientists have observed many sedges, grasses, and forbs that tolerate prolonged flooding and drought.

Shorelines

The shorelines surrounding each of the Garden's nine islands are planted with tens of thousands of native and ornamental plants, extending gardens into the water. An array of aquatic and semiaquatic plants that range from native grasses to sedges help prevent erosion on the miles of Chicago Botanic Garden shoreline. Lotuses and waterlilies provide color and drama during the summer months and well into autumn. Shoreline plantings provide a rich ecosystem for birds, insects, fish, turtles, and other wildlife. At the same time, the shores of the Great Basin demonstrate ways to restore and protect shorelines of lakes and ponds. Native shrubs of local provenance such as *Cornus drummondii* and *Hypericum kalmianum* are also used to stabilize and prevent shoreline erosion. Over 3800 accessioned plants are growing in the shoreline, consisting of 286 taxa.

Plant Science Center Rainwater Glen

The shallow, trough-like depression that surrounds the Plant Science Center is called the Rainwater Glen, and it functions like a river's floodplain. Though beautiful, it is above all practical: designed to hold back storm water runoff, it allows deep-rooted native plants to facilitate absorption and help filter impurities. The native plants in the Rainwater Glen have reduced the need for irrigation by half, and no potable water is used for irrigation. The Rainwater Glen contributes to improved water quality at the Chicago Botanic Garden and to the health of each of the ecosystems it flows through. Species planted in the rainwater glen include ornamental wetland plants like *Acorus calamus*, *Asclepias incarnata*, *Baptisia alba* var.

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macrophylla, as well as ornamental cultivars of wetland trees and shrubs like *Betula populifolia* 'Whitespire', *Amelanchier x grandiflora* 'Autumn Brilliance', *Aronia melanocarpa* 'Autumn Magic', and *Viburnum x rhytidophylloides* 'Allegheny'.

Documentation

The highest standards of documentation will be applied to all living collections as described in the Plant Documentation Plan and Policy (See Appendix A).

Acquisition

As a museum and a botanical garden, the Garden will collect plant material from various sources. Plants will be acquired through donations from other botanic gardens, arboreta, private collectors, purchases from commercial sources, plant exploration trips, *in situ* seed collections from plants already growing at the Garden, and from breeding programs. All wild-collected germplasm will be of known provenance, and legally collected and/or imported. Permits will be obtained in advance of all collecting expeditions. When species are imported, all required import and export permits will be prepared as needed, and collected specimens submitted for USDA inspection. New acquisitions should contribute to display, research, or conservation collections at the Garden, or contribute to increasing collections from target genera or collecting regions. The Garden is compliant with the Convention on Biological Diversity and will only share plant material appropriately. When plants are collected outside of the United States, the Garden is committed to demonstrating the utmost respect to the nation from which plants are being collected and any collaborating institutions. For this reason, a Memorandum of Understanding (MOU) is signed between the PCC (Plant Collecting Collaborative) and the host nation on every expedition. Generally, the MOU explains that plants collected will be utilized for research purposes and displayed in botanic gardens, arboreta, and *ex situ* conservation collections. The MOU also assures acknowledgment of all collaborators abroad in any publication, and requires additional agreements prior to commercialization of any collected taxa.

Weed Risk Assessment

Wild-collected plants will also be run through a weed risk assessment protocol to prevent potentially over-aggressive or invasive plants from entering the Garden's collections. The weed risk assessment protocol is as follows: potential accessions are cross-checked against the Chicago Botanic Garden's invasive species list and commercially-available taxa. If the plant is not found on the Garden's invasive species list and is commercially available, it is accepted and accessioned. If not, and enough information is available to perform a weed risk assessment, the species in question is evaluated in terms of seed dormancy, seed longevity, seed hardiness, time to maturity, self-compatibility, plant hardiness, potential seed dispersal, and vegetative spread. Taxa deemed potentially invasive after this screening will not be accepted. The Garden has an Invasive Plant Policy that outlines species prohibited from use at the Garden, and species of concern that are being monitored for invasive potential. See Appendix F.

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Distribution

The Garden will share its living collections through the distribution of germplasm to professional colleagues at other arboreta/botanic gardens, research institutions, plant breeders, and other interested parties. When over-production of plants from our nursery/greenhouse facilities occurs, excess plant material will be offered to institutional members of the Plant Collecting Collaborative (PCC). Any excess plant material not claimed by member of the PCC will be offered to other arboreta/botanic gardens.

Curatorial Process

Five and ten year collections plans are used to manage the short and long term development of the Garden's living plant collections. These collections plans are developed as a collaboration of the collections department, plant documentation, horticulture, and senior leadership. The plans guide the curatorial process by outlining the annual review process, listing new target regions and genera, linking seasonal garden themes to collections, exploring collecting collaborations, and ensuring verification and record keeping of existing collections.

Annual reviews of collections entail a curatorial review as well as a walkthrough of the collections with the appropriate Curator, the Plant Collections Specialist, the Director of Plant Collections, staff Horticulturists, and the Vice President of Horticulture. Each collection and garden zone will be reviewed as time permits until all have been evaluated, at which point the process will begin again, to ensure that collections are continually updated.

When new projects are started, garden curators are involved in a multi-step process for acquiring new plants, described in detail in Appendix E. This process starts with the design concept: plants appropriate to the area are recommended to the landscape architect or incorporated into the design. When the recommended plant list is approved, the relevant curator sources the garden material and inspects the plants to meet Chicago Botanic Garden standard.

APPENDIX A: Plant Documentation Plan and Policy

CHICAGO BOTANIC GARDEN'S PLANT DOCUMENTATION PLAN AND POLICY

Introduction

In 1989, the Botanic Gardens Conservation Strategy published by World Wildlife Fund (WWF) and the International Union for the Conservation of Nature and Natural Resources (IUCN) defined a botanic garden as:

... a garden containing scientifically ordered and maintained collections of plants, documented and well labeled, and open to the public for the purposes of recreation, education and research.

Documented collections of objects (in this case, plants) exemplify a museum. The Wright Report, a landmark study of museums in Great Britain, emphasizes the importance of documentation by stating:

In order to be able to interpret and communicate knowledge effectively, a museum must first have detailed and accurate information about the objects in its collection. Museums can provide an efficient service only if their information resources are readily available and if their records are revised as a continuing process.

Alberta Sebolt George in Museum Education Anthology noted:

Museums, like every other institution in our society, thrive to the degree that they make their resources available to the public. An important part of the mission of museums rests in developing strategies to increase access to their unique resources for a broad audience.

The documentation of plants and the environment in which they grow is a basic and necessary tool. These records are used by staff, scientists, educators and the public. They provide a detailed history of the scientific name, source, location(s), conservation value, and other attributes of the plants within the Garden's collections.

Key Attributes of the Present Documentation System

Plant records at the Chicago Botanic Garden are maintained by the Living Plant Documentation department. In addition to gathering and maintaining data, this department is also responsible for the creation of various types of labels, the mapping of the collections, collection of herbarium vouchers, DNA samples, and digital images. Garden staff and other audiences utilize these records, maps, labels, vouchers, samples, and images in several ways.

The Garden's plant records are maintained within a computer database referred to as CBGRecorder. The database includes fields of data for each accession that reference:

APPENDIX A: Plant Documentation Plan and Policy

- A unique accession number
- Identification (scientific name and common names)
- Authority (the person who published the scientific name)
- Scientific reference confirming the accuracy of the taxon name
- Provenance or source information about when and from where the plant(s) entered the collection
- Location of the plants within the collection by garden, planting bed, and x/y coordinates
- Growth habit (tree, shrub, perennial, vine, groundcover, bulb, succulent, annual)
- Number of plants received and/or still alive
- Information about the plant(s)' transfer to other locations
- Health
- Size (height, trunk diameter at breast height, width of canopy)
- Conservation status (rare, threatened, endangered)
- Use of the plant for food or medicine; poisonous properties
- Causes of plant removal/death (where applicable)
- Ornamental characteristics

It is the responsibility of the Living Plant Documentation department to create accession tags and display labels for all plants in the collection. Display labels for the use of visitors typically include: scientific name, plant family name, common name, and native range. Accession tags are another type of label used by Horticulture and Curatorial staff to maintain the collections. These labels typically include: accession number, source, scientific name, and plant number.

Collection and Management of Data

Over 1,000 fields are available in this database to record information related to the scientific name of each plant, scientific references that validate the name of each plant, information about where the Garden obtained the plant, characteristics of the natural areas from which the wild collected propagules were obtained, names of gardens in which the plants can be found, and a history documenting the number of plants initially received, their movements to different locations, and causes of death or removal from the collections.

Twice a year, a summary of the growth of the collection is provided to staff and senior management that reflects the current state of the Collections after recent accessions and de-accessions have been tallied.

The Receiving Module for the Plant Requisition System was created to reconcile differences between purchase orders and the received plants. Differences in taxon ordered versus taxon received, catalog price versus received price, quantity ordered versus quantity received, and transportation costs (at best, transportation costs are vendor estimates) reflect the dynamic status of the nursery stock available at any one time and the continuing efforts of staff to obtain the best plants at the best price. A Receiving Module documents the plants that are received.

APPENDIX A: Plant Documentation Plan and Policy

PRS shares the purchase order information with databases in Living Plant Documentation, Ornamental Plant Evaluation, and Plant Production. Upon issuance of a purchase order, the information is shared electronically with the Production database (and the Evaluation databases, once they are updated to Sequel). Upon receipt of plants in the PRS Receiving Module, the data is electronically shared with the Recorder database (upon completion of the Sequel in 2011). A Labeling database is also due to be migrated and improved in Sequel permitting PRS and annual plant order information from the Production database to be collated and formatted for submittal to the label contractor.

Maps

The mapping process is an important aspect of collection management. Maps document the exact locations of accessioned plants in the Garden, and serve as an important safety net when display labels and accession tags are inadvertently removed.

Accurate inventories are critical to the mapping process. As of 2018, more than half of all garden maps have been updated within the last seven years. Existing maps should be updated every five years to capture information on moved plants, deaccessions, and additions to the collection. Each area is accurately inventoried and labeled before the Mapping Technician and volunteers begin the mapping process. Maps link a specific plant and the related records in the database to a specific location.

An IMLS Museums for America grant through the Communication department created an interactive display for visitors to use to locate plants of interest using maps. An upgrade to this application is in the implementation stage to provide access to accession level data to Garden staff and curators. Accession level data includes sources and locations of rare or endangered plants and are withheld from the public to prevent pilfering of natural populations by thieves.

Data for the Garden's maps is collected with a hand-held GPS device to accurately record the locations and change in elevation of plants. The data is electronically downloaded into the Environmental Systems Research Institute (ESRI) ArcGIS mapping software. Programming was completed in 2011 to transfer the field-collected data from the mapping software to the records database. This upgrade decreased the amount of time needed to create a map.

Labels

In any museum, an accessioned object (at CBG these are plants) without a label identifying what the object is fails a critical mission to "instruct and inform" visitors. Plant labels document the scientific name, common name, plant family and native range and are created for the use of visitors, instructors, students, staff and volunteers.

Label requests are submitted by Horticulture staff, instructors, curators, and a team of departmental volunteers dedicated to maintaining a well-labeled collection.

APPENDIX A: Plant Documentation Plan and Policy

Every woody permanent plant should have an accession tag in the Garden. Each accessioned plant in the Garden should have an accession tag to permit quick and accurate identification. This includes herbaceous perennials, bulbs, tropical, and groundcovers. Accession tags for non-woody plants will be placed at ground level near the center of the plant. Due to the large number of small herbaceous plants in areas such as the Rock Garden, accession tags should not be visible.

Plant Database

Electronic plant databases replace traditional bound accession books in recording all the characteristics of the plants in the permanent collection and the names of annuals that are labeled. The Garden's records, which date back to 1972, have been computerized since 1985. A database of more than 2.6 million accessioned plants in the permanent collection contains information on each plant's scientific name, common name, plant family, growth habit, origin, location, and ornamental characteristics. Staff members work throughout the year to keep this information updated and accurate.

The initial stages in the creation of a Garden-wide Plant Database have been completed with the upgrade and linkage of CBGRecorder, Survey, Plant Requisition System, and Ornamental Plant Evaluation databases, Plant Production records, the creation of a Donor Plants database, and of web-searchable copies of CBGRecorder and the Ornamental Plant Evaluation database on the CBG website.

Digital Images

The Chicago Botanic Garden uses digital images to record the physical attributes of the NACP Collections and the taxonomic characteristics used to distinguish one plant from another. These include flower color, vegetative characteristics, fruit, and fall color. Most plant pigments are not stable as herbarium vouchers. These documented images, combined with traditional herbarium vouchers and/or DNA vouchers, are critical to the process of verifying the authenticity of the plants held at the Garden by recognized taxonomic authorities for each of the Specialized Collections.

The digital images collection will also ultimately include 300,000 (estimated) scanned slides used by Garden staff to teach classes, document the growth and history of the Garden, and for professional presentations. In addition to high quality images of plants, these scanned images preserve the remarkable history of the Garden, those individuals important to its success, and key milestones celebrated over the last 50 years.

As of February 2018, 354,451 digital images of plants plus 95,398 scanned images of plants, people, places and events have been saved to a series of Garden storage devices occupying 2.376 terabytes of storage space.

APPENDIX A: Plant Documentation Plan and Policy

Convention on International Trade in Endangered Species (CITES)

The Living Plant Documentation staff maintains copies in their files of the federal, state and international permits accompanying imported germplasm for all areas of the Garden. The Director of Living Plant Documentation is the Garden's authority on CITES issues. Staff should consult this person when dealing in imported plants of concern. The CBGRecorder database maintains fields that permit the tracking of plants that are subject to these regulations. The Director of Living Plant Documentation, in consultation with the Director of Plant Collections is the authorized representative for obtaining plants confiscated under CITES by the U.S. Fish and Wildlife Service through their Rescue Center program.

As of February 2018, five hundred and twelve taxa of plants in the collections are identified as being on lists of plants of conservation concern maintained by CITES, International Union for the Conservation of Nature (IUCN), United States Fish and Wildlife Service (USFWS), Illinois Department of Natural Resources (IDNR), Center for Plant Conservation (CPC) and several Red Books (international equivalents of USFWS).

APPENDIX B: Chicago Botanic Garden Collections Statistics (January 2018)

Families represented: 237

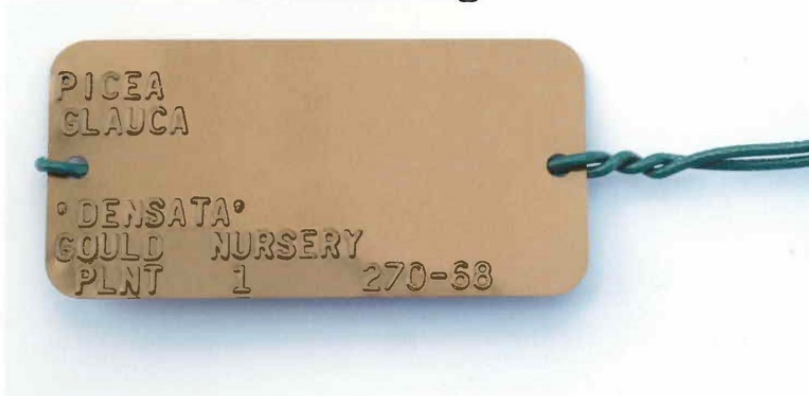
Active accessions: 25,185

| Statistics by habit: | Quantities | Taxa |
|----------------------|------------------|---------------|
| Trees: | 16,319 | 1,956 |
| Shrubs: | 68,085 | 2,767 |
| Vines: | 10,012 | 422 |
| Groundcovers: | 155,278 | 51 |
| Perennials: | 1,425,085 | 5,084 |
| Bulbs: | 1,012,576 | 1,267 |
| Cactus: | 793 | 152 |
| Aquatics: | 27,055 | 83 |
| Epiphytes: | 1,102 | 334 |
| Annuals*: | 1,386 | 57 |
| TOTALS: | 2,717,691 | 12,173 |

| Statistics by garden: | Quantity | Taxa | Records |
|-----------------------------|----------|-------|---------|
| Aquatic Garden: | 459 | 57 | 74 |
| Bulb Garden: | 45,774 | 456 | 672 |
| Circle Garden: | 1,611 | 34 | 70 |
| Dwarf Conifer Garden: | 9,485 | 395 | 470 |
| Enabling Garden: | 987 | 126 | 148 |
| English Walled Garden: | 33,877 | 524 | 714 |
| Esplanade: | 63,749 | 40 | 99 |
| Evening Island: | 296,826 | 271 | 668 |
| Fruit & Vegetable Garden: | 30,783 | 441 | 603 |
| The Greenhouses: | 7,025 | 1,064 | 1,235 |
| Green Roof: | 48,506 | 253 | 335 |
| Grunsfeld Growing Garden: | 3,181 | 46 | 50 |
| Heritage Garden: | 23,189 | 324 | 432 |
| Japanese Garden: | 34,747 | 249 | 525 |
| Kleinman Family Cove | 6,645 | 199 | 228 |
| Lakeside Gardens: | 88,274 | 202 | 433 |
| Landscape Garden: | 28,906 | 812 | 1,160 |
| Lavin Evaluation Garden | 8,815 | 775 | 868 |
| McDonald Woods: | 18,352 | 612 | 987 |
| Model Railroad: | 5,731 | 334 | 498 |
| Native Plant Garden: | 14,884 | 222 | 484 |
| Prairie & Marsh Island: | 522,840 | 394 | 1,165 |
| Rainwater Glen: | 31,983 | 125 | 158 |
| Regenstein Learning Center: | 88,250 | 226 | 287 |
| Rose Garden: | 13,913 | 335 | 1,129 |
| Sensory Garden: | 97,528 | 531 | 743 |
| Shaw Flower Walk: | 17,480 | 152 | 257 |
| Skokie River: | 164,018 | 207 | 645 |
| Spider Island: | 21,682 | 113 | 209 |
| Waterfall Garden: | 21,626 | 447 | 659 |
| Water Gardens/Shorelines: | 304,208 | 283 | 835 |

*Includes mostly self-seeding native plants. It does not include annual plants in seasonal displays.

Accession Tag



Temporary Label



Permanent Label



APPENDIX D: Glossary

GLOSSARY

Accession - The basic documentation unit. All plants of the same taxon that come from the same source and are brought to the Garden at the same time are one accession. Each accession represents one addition to the breadth of the collection.

Accession tag - A brown colored, credit card-sized piece of embossed aluminum that contains the scientific name of the plant, the accession number, source, and a unique “plant number” to permit each plant within an accession to be individually mapped. Accession tags are placed on woody plants only and are for the use of Garden staff.

Common name - Any name given by any person that does not follow the rules governing taxonomic nomenclature. Frequently, common names reference some aspect of the plant or traditional uses. Common names for plants are found in all cultures and in all languages.

Cultivar - A specific plant selected for desirable characteristics (prettier flowers, larger fruit, more desirable growth habit are a few examples). Cultivars are found in cultivated fields or gardens and are created through plant breeding, natural hybridization or spontaneous genetic mutations.

Database - A database is nothing more than a collection of information. Each database contains one or more tables. Tables contain data that share something in common (for instance, all the information related to the scientific name of our plants is stored in the table identified as CBGPlantNames). Each table is divided into fields. Fields identify the information stored in each column of a table (for instance the Field Name ‘Genus’ in the CBGPlantNames table holds the name of the genus of a plant).

Display labels - Created for all plants on display in the public accessed areas of the Garden and contain the scientific name, common name, *cultivar*, native range, and plant family. Display labels typically have a black background with white letters and are placed on stakes near the plant(s). Display labels reflect the scientific basis for the collection and are critical to informal and formal education efforts of the Garden.

Garden Database - A linkage of all the databases (not limited to the Plant Database) within the Garden to enhance access to information by Garden staff.

Genus (plural genera) - A taxonomically identified group of plants that share a common flower morphology. This is the first subdivision of all the plants that belong in a plant family.

Geospatial data - Information that is displayed using maps (latitude, longitude, elevation, height of plant, width of plant). Geospatial data is gathered and entered into the database by the Mapping Technician. The Mapping Technician maintains detailed maps that pinpoint the location of woody plants within the Garden collection.

APPENDIX D: Glossary

Geographic Information System or GIS - The formal scientific name used to describe the linkage of data collected by the Plant Records Supervisor and the Mapping Technician. The Garden's GIS permits our scientists to analyze information from the maps and database simultaneously.

Morphology - The physical structure of the plant as observed using whole plants. Key characteristics for taxonomic purposes relate to the size, shape, color, relative hairiness and fragrance of the various flower parts.

Native range - A description of the area of the wild populations of a taxon. Cultivars, because of their origin in gardens, are given no range description.

Plant - For documentation purposes, the plant is the basic unit of measure. Each plant grown in the permanent collections of the Garden has been assigned an accession number, identified (or is in the process of being identified) as to taxon, associated with a source and described as residing in a unique Garden location. Each plant represents one addition to the documentation, curatorial and horticultural workload of Garden staff.

Plant Database - A series of databases that store plant related data that are linked together to reduce redundant data entry and to provide access to all information about the plants held at the Garden through a single application.

Plant family - A taxonomic classification that links plants through common floral characteristics, and increasingly by DNA analysis.

Scientific name - The combination of genus plus one or more of the following: species, subspecies, forma, variety, cultivar. Scientific names are cross-cultural and transcend languages.

Species - The taxonomic unit at which all the members of a closely related group of plants can easily hybridize with each other.

Subspecies - Members of a species that exhibit consistent unique traits that distinguish these plants from the general population. Some biologists consider this to be the first step on the evolutionary process of creation of new species.

Taxon (plural: taxa) - The basic taxonomic unit. All plants that share the same taxonomic characteristics are treated as one taxon and they share the same scientific name. Each taxon represents one addition to the depth (biodiversity) of the collection.

APPENDIX E: Steps to Curating a Collection

STEPS TO CURATING A COLLECTION

1. **Identify the genus or groups of plants to be curated**
2. **Evaluate the existing collection**
 - a. Generate a current list of all existing accessions in the collection.
 - b. Field check all accessions to make sure they exist in the collection.
 - c. Evaluate plants in the collection. Note those in poor condition which might need replacement or propagation.
 - d. Evaluate the collection for aesthetic impact. Is each representative of a taxa effectively displayed in the Garden?
 - e. Evaluate the existing cultural conditions. Make suggestions for improving the cultural conditions and make suggestions regarding the care of the collection. These comments should be attributed specifically to each accession.
3. **Develop a list of plants that should be removed from the collection**
4. **Develop a list of suggested additions to the collection**
 - a. Review literature:
 - i. Catalogs
 - ii. Magazines and journal articles
 - iii. Reference books and monographs
 - iv. Internet resources
 - b. Visit arboreta and botanic gardens to evaluate other collections.
 - c. Consult knowledgeable professionals and experts.
5. **Develop a planting plan for new additions**
 - a. Identify where the new additions will be planted.
6. **Source material**
 - a. Find sources for all suggested additions.
 - b. Specify size of plants to acquire.
 - c. Specify number of plants to acquire.
 - d. Specify price per plant.
 - e. If the plants are to be propagated in-house, create a propagation schedule.
 - f. Develop a budget for the project.
 - g. Develop list of seed or cuttings to be acquired from:
 - i. Another institution.
 - ii. Index Seminum.
 - iii. Collecting trips.
7. **Develop a schedule of implementation**
 - a. Create a timeline or schedule as to when the proposed new additions will be acquired and planted.

APPENDIX F: Invasive Plant Policy

Chicago Botanic Garden Invasive Plant Policy

Introduction:

Invasive plants and animals are threatening our nation's environment and economy. Invasive species pose an enormous threat to our native plants, animals and ecosystems. In fact, their toll on the environment is second only to habitat destruction. Nearly half of the species listed as threatened or endangered under the Endangered Species Act are at risk due to competition with or predation by non-native species. Invasive species can also alter communities by changing the hydrology or soil chemistry. Invasive species are costing the United States nearly \$125 billion per year (www.invasivespecies.gov). Some of the worst weeds in natural areas in Illinois include purple loosestrife (*Lythrum salicaria*), Japanese and bush honeysuckles (*Lonicera japonica*, *L. maackii*, *L. tatarica*, *L. morrowii*), garlic mustard (*Alliaria petiolata*) and buckthorns (*Rhamnus cathartica* and *R. frangula*).

Although invasive plants are almost always not native to a region, it is important to note that most non-native species are not invasive. In addition, some native species can become invasive. For the purposes of this document, the following definitions will be used:

- **Native** (indigenous) – a species that was present in North America prior to European settlement or has arrived since through natural means of dispersal.
- **Non-native** (exotic, alien, introduced) – a species that was brought to North America by humans, either deliberately or accidentally.
- **Naturalized** – a non-native species, or native species from another region of the country, that has become established in disturbed areas and/or native communities.
- **Weedy** – a species that readily spreads, especially in disturbed areas, but generally does not pose a threat to the integrity of native plant communities.
- **Invasive** – a species, usually non-native, that is able to establish itself within existing native plant communities and is posing a threat to the integrity of the community.

When plants are introduced to a new location, either intentionally or accidentally, they can spread prolifically, out-compete native species for resources, and eventually even dominate the landscape. Biologists are studying the mechanisms underlying a taxon's ability to become invasive, but for now it is still difficult to predict whether or not a species will become invasive in a new habitat. Some factors common to many invasive plants include:

- Escape from natural enemies
- Rapid growth and early maturity
- Production of many seeds

APPENDIX F: Invasive Plant Policy

- Ability to reproduce vegetatively
- Seeds that are dispersed widely (such as by birds or wind) and seeds that germinate quickly (do not have long dormancies)
- Apomictic seed production (production of seed asexually)

People have introduced the vast majority of invasive species, either accidentally or deliberately. For example, kudzu was introduced to control soil erosion. Many non-native species came to the United States with the colonists who wanted familiar food and garden plants. Some invasive species were, or still are, popular ornamental plants used in landscaping. The rapid expansion of global trade and human mobility has led to many

APPENDIX F: Invasive Plant Policy

species arriving accidentally. Seeds can hitch rides to new locations in cargo or even stuck to the bottom of hiking boots.

The federal government has responded to the invasive species crisis in several ways. President Clinton issued an Executive Order (13112) on invasive species in February 1999. The order established the National Invasive Species Council to provide national leadership on invasive species; see that Federal efforts are coordinated and effective; promote action at local, state, tribal and ecosystem levels; identify recommendations for international cooperation; facilitate a coordinated network to document and monitor invasive species; develop a Web-based information network; provide guidance on invasive species for Federal agencies to use in implementing the National Environmental Policy Act; and prepare a management plan. The plan, “Meeting the Invasive Species Challenge Management Plan” was completed by the Council and signed by President Clinton on January 18, 2001. Of relevance to botanic gardens, the plan calls for the development of a screening and evaluation process by 2006 for the introduction of non-native plants to the United States. The USDA and Department of the Interior will have oversight for plant importation processes.

Chicago Botanic Garden – History:

The Chicago Botanic Garden is well known for its diverse and beautiful horticultural displays. One of its goals has been to develop the most diverse horticultural plant collection in the Midwest. To build its collection, the Garden has been an active participant in exploration trips to countries in Asia and Europe, as well as other parts of the United States, to bring back new plants with horticultural merit. The Ornamental Plant Development department has programs in plant breeding, plant evaluation, and plant introduction with goals of developing, selecting, recommending, and introducing the best horticultural plants for the Chicago region to the nursery industry.

In recent years the Garden has become more concerned about invasive plants. Nearly one-third of the Chicago Botanic Garden’s 385 acres is devoted to Native Habitat areas. There, Garden staff are actively implementing and conducting research on management protocols that remove invasive plants and help prevent their recolonization. The Chicago Botanic Garden is now evaluating many of the plants collected abroad through the Plant Exploration Program before they enter the collection. Species that show signs of weediness in the evaluation period (four years for herbaceous plants, seven to ten years for woody plants) are destroyed. The Garden’s Collections Policy states that any plant “which has the potential to threaten the genetic diversity of local native populations, has overly aggressive behavior (weedy), or the ability to introduce pests or diseases will be screened and evaluated before being accepted into the Collection.”

Today, with an increased awareness about the environmental and economic threats posed by invasive species, the Chicago Botanic Garden is expanding and strengthening its invasive plant policy. The Garden aims to strengthen its role as a conservation leader without compromising its horticultural mission or the beauty of its landscapes.

APPENDIX F: Invasive Plant Policy

Chicago Botanic Garden Invasive Plant Policy

1. Species known to be invasive in the Chicago region* will not be added to the collection. When species are determined to present a risk of becoming invasive, they will be removed from the collection and destroyed. Whenever possible, interpretation about invasive species removal will be provided. The Garden will also develop, utilize, and promote a list of acceptable noninvasive plants with similar landscape utilizations as the plants being removed as part of its interpretive efforts.
2. Attached (Appendix 1) are two lists: the first “Invasive Plant List” is a current list of known invasive species in the Chicago region. The second “Watch List” is for taxa that are potential or suspected invasive species. The Watch List includes taxa that are weedy in the Chicago region but not yet invasive, as well as taxa that are invasive in similar climates but have not become problematic in this area. If taxa on the Watch List are found in the collection, they will be monitored for invasiveness. Addition of Watch List taxa to the collection should be avoided, especially if suitable landscape/display alternatives are available, but exemptions may be made with Committee approval.
3. For our purposes, all cultivars of the listed species are presumed to have the same invasive status (R, P, E or Watch) as its parental taxon until/unless exempted by the Garden's Invasive Plant Committee. In order to exempt a cultivar, it must be proven to be sterile for species that reproduce by seed. Male cultivars of dioecious species may also be exempted. For species that reproduce vegetatively, additional evaluation may be necessary. All species on the invasive list (and their cultivars) have been assigned one of three courses of action: (1) Remove: for known invasive species/cultivars – remove as soon as possible, including all cultivars, and do not add to collection in future; (2) Phase out: for species that pose a lesser invasive risk, form significant structural features in landscape, and will be costly and time-consuming to replace – phase out over a five to ten-year period; (3a) Evaluate (for taxa already in collection): taxa where invasiveness of the parental taxon (wild type species) is demonstrated, but the risk posed by the cultivars is not known – evaluate cultivars in relation to the wild type species and then remove invasive taxa; taxa under evaluation will not be added to the Garden’s collection except for research purposes (assessment of invasiveness within the Plant Evaluation Program or other research projects that have been brought to the attention of the Invasive Plant Committee), or (3b) Evaluate (for taxa new to collection): follow decision tree in Appendix 2, which could ultimately lead to an evaluation trial.
4. The same level of documentation will be required both to list a species, as well as to exempt (delist) species (and/or cultivars). The definitions of documentation types are listed in Appendix 3. Anecdotal information alone will not be sufficient to list or delist a taxon; rather, observational, other published material, and/or reviewed scientific publications will be required. The Committee member proposing a taxon status change shall provide relevant documentation to the Invasive Plant Committee co-chairs at least one week before a Committee meeting where a vote may be taken.

* Chicago region as defined by Swink and Wilhelm (1994) in *Plants of the Chicago Region*, the following 22 counties: Walworth, Racine, and Kenosha counties in Wisconsin; Boone, McHenry, Lake, DeKalb, Kane, DuPage, Cook, Kendall, Will Grundy and Kankakee counties in Illinois; Lake, Newton, Porter, Jasper, LaPorte, Starke, and St. Joseph counties in Indiana; and Berrien County in Michigan.

APPENDIX F: Invasive Plant Policy

5. Interpretation about many of the species under evaluation will be provided. The list will be reviewed annually by the Garden's Invasive Plant Committee and will be revised as needed. Invasive species removal in Garden areas will be the responsibility of the Horticulture Department in consultation with the Collections Department. A reasonable timeframe will be established for the removal of plants that are key components of designed displays such that those landscapes are not unduly impacted.
6. The Chicago Botanic Garden will follow all laws on importation and quarantine of plant materials across political boundaries. The Garden will perform risk assessment for all plants introduced to the Garden via its plant exploration program, to help ensure that new harmful species do not escape cultivation (as outlined in Appendix 2). Species new to the United States, whether herbaceous or woody, will also be evaluated for at least four years after reaching reproductive maturity. The evaluation will follow the protocols developed by the Plant Evaluation Program and must be completed prior to the species' inclusion in the permanent collections.
7. The Chicago Botanic Garden will not distribute or promote plants, seeds, or cuttings or other propagules of any germplasm within its collections (research or permanent) that is on the Invasive Plant List (R or P) or under evaluation for invasiveness (E on list, as well as taxa from plant collection trips). Plants that are, or would likely become, invasive in the Chicago region or the upper Midwest (R, P, and E), will not be distributed via the Garden plant sales or the Chicagoland Grows plant introduction program. Watch List plants will not be distributed or sold without a written warning of their potential invasiveness. The Garden will no longer continue the Index Seminum (seed exchange) program, but will consider individual requests for propagules on a case-by-case basis.
8. The Garden will work to control invasive species in the Native Habitat areas, lakes, and on Garden grounds generally. Staff training in recognition and removal techniques of invasive species will be implemented. The Garden will disseminate information about invasive species control based on our experiences.
9. The Conservation Science Department will conduct research on the biology of invasiveness and assist with the design and implementation of evaluation studies on the invasive potential of untested plant species.
10. The Ornamental Plant Development Department will evaluate the invasive potential of untested plants, and when appropriate, strive to develop noninvasive forms of known-to-be invasive landscape plants.
11. The Chicago Botanic Garden will educate the public and the nursery industry about preventing the introduction and spread of invasive species. Instructors for the School of the Chicago Botanic Garden will be provided with a list of regionally-invasive species and will be asked to provide information about invasiveness to course takers. Garden staff and School instructors may not recommend plants that the Garden is removing or has removed from the collections, or are under evaluation, based on the issue of invasiveness (i.e. on the Garden's Invasive Plant List).

APPENDIX F: Invasive Plant Policy

12. The Garden will assess the threat that popular or common horticultural plants may present to related native plants in the wild (conspecifics and congeners). The possibility of hybridization threatening wild plant populations and their genetic integrity will be assessed. If a significant risk is present, alternatives to those horticultural plants will be sought.

Many of the policy statements are adapted from S. Reichard and P. White, 2000. Guidelines for Botanic Gardens with a Conservation Ethic. World Botanic Gardens Conservation Congress.

APPENDIX F: Invasive Plant Policy

Appendix 1: Invasive and Watch Plant Lists

A. Invasive Plant List

Plan: R = Remove as soon as possible if present on grounds either deliberately or spontaneously, including all cultivars, and/or do not add to collection in future; P = Phase out (species that pose a lesser invasive risk, form significant structural features in landscape, and will be costly and time-consuming to replace will be phased out over a five to ten-year period); I = Interpret; E = Evaluate species and cultivars, then remove invasive taxa, and add them to invasive plant list as R species.

| Taxon | Plan |
|------------------------------------|------|
| <i>Acer ginnala</i> | P |
| <i>Acer platanoides</i> | R |
| <i>Aegopodium podagraria</i> | R |
| <i>Agropyron repens</i> | R |
| <i>Ailanthus altissima</i> | R |
| <i>Alliaria petiolata</i> | R |
| <i>Alnus glutinosa</i> | P |
| <i>Alternanthera philoxeroides</i> | R |
| <i>Ampelopsis brevipedunculata</i> | R |
| <i>Anthriscus sylvestris</i> | R |
| <i>Arctium minus</i> | R |
| <i>Artemisia absinthium</i> | R |
| <i>Azolla spp.</i> | R |
| <i>Berberis thunbergii</i> | R |
| <i>Berberis vulgaris</i> | R |
| <i>Bromus inermis</i> | R |
| <i>Butomus umbellatus</i> | R |
| <i>Cabomba caroliniana</i> | R |
| <i>Carduus nutans</i> | R |
| <i>Celastrus orbiculatus</i> | R |
| <i>Centaurea maculosa</i> | R |
| <i>Cirsium arvense</i> | R |
| <i>Cirsium palustre</i> | R |
| <i>Cirsium vulgare</i> | R |
| <i>Conium maculatum</i> | R |
| <i>Coronilla varia</i> | R |
| <i>Cotoneaster multiflorus</i> | P |
| <i>Daucus carota</i> | R |
| <i>Dioscorea batatas</i> | R |

APPENDIX F: Invasive Plant Policy

| | |
|--|--------------------|
| <i>Dipsacus laciniatus</i> | R |
| <i>Dipsacus sylvestris</i> | R |
| <i>Duchesnia indica</i> | R |
| <i>Echinops sphaerocephalus</i> | R |
| <i>Egeria densa</i> | R |
| <i>Eichornia crassipes</i> | R |
| <i>Elaeagnus umbellatus</i> | R |
| <i>Epilobium hirsutum</i> | R |
| <i>Euonymus alatus</i> | R |
| <i>Euonymus europeaus</i> | R |
| <i>Euonymus fortunei</i> | E, I |
| <i>Euphorbia cyparissias</i> | R |
| <i>Euphorbia esula</i> | R |
| <i>Festuca elatior</i> (=F. <i>arundinacea</i>) | R |
| <i>Festuca pratense</i> | R |
| <i>Glechoma hederacea</i> | R |
| <i>Hemerocallis fulva</i> (locally invasive) | R (wild type only) |
| <i>Heraclium mantegazzianum</i> | R |
| <i>Hesperis matronalis</i> | R |
| <i>Hippophae rhamnoides</i> | R |
| <i>Hydrilla verticillata</i> | R |
| <i>Hydrocharis morsus-ranae</i> | R |
| <i>Hypericum perforatum</i> | R |
| <i>Ipomoea aquatica</i> | R |
| <i>Iris pseudacorus</i> | R |
| <i>Lespedeza cuneata</i> | R |
| <i>Leymus arenarius</i> | R |
| <i>Ligustrum obtusifolium</i> | P |
| <i>Ligustrum vulgare</i> | P |
| <i>Linaria vulgaris</i> | R |
| <i>Lonicera japonica</i> | R |
| <i>Lonicera maackii</i> | R |
| <i>Lonicera morrowii</i> | R |
| <i>Lonicera tatarica</i> | R |
| <i>Lonicera x bella</i> | R |
| <i>Lotus corniculatus</i> | R |
| <i>Lysimachia nummularia</i> | R |
| <i>Lysimachia verticillata</i> | R |
| <i>Lythrum salicaria</i> | R |

APPENDIX F: Invasive Plant Policy

| | |
|--|---|
| <i>Malus spp.</i> (crabapples) | E, I |
| <i>Melilotus alba</i> | R |
| <i>Melilotus officinalis</i> | R |
| <i>Microstegium vimineum</i> | R |
| <i>Miscanthus sacchariflorus</i> | R |
| <i>Miscanthus sinensis</i> | P (exempted cultivars are M.s. 'Silberpfeil,' 'Hinjo' and <i>Miscanthus x giganteus</i>) |
| <i>Morus alba</i> | P |
| <i>Myriophyllum aquaticum</i> | R |
| <i>Myriophyllum spicatum</i> | R |
| <i>Najas minor</i> | R |
| <i>Nasturtium officinale</i> | R |
| <i>Nymphoides peltata</i> | R |
| <i>Pastinaca sativa</i> | R |
| <i>Perilla frutescens</i> | R |
| <i>Phalaris arundinacea</i> | R |
| <i>Phellodendron amurense</i> (excluding male cultivars) | R |
| <i>Phellodendron japonica</i> (excluding male cultivars) | R |
| <i>Phragmites australis</i> | R |
| <i>Pistia stratiotes</i> | R |
| <i>Poa compressa</i> | I |
| <i>Poa pratensis</i> | I |
| <i>Polygonum cuspidatum</i> = <i>P. japonicum</i> | R, (E cv. Crimson Beauty) |
| <i>Polygonum perfoliatum</i> | R |
| <i>Polygonum sachalinense</i> | R |
| <i>Populus alba</i> | P |
| <i>Portulaca oleracea</i> | R |
| <i>Potamogeton crispus</i> | R |
| <i>Potentilla argentea</i> | R |
| <i>Prunus mahaleb</i> | P |
| <i>Pueraria montana</i> = <i>P. lobata</i> | R |
| <i>Pyrus calleryana</i> | P |
| <i>Ranunculus ficaria</i> | R |
| <i>Rhamnus cathartica</i> | R |
| <i>Rhamnus frangula</i> | R |
| <i>Robinia pseudoacacia</i> | R |
| <i>Rorippa sylvestris</i> | R |
| <i>Rosa multiflora</i> | R (check rootstock) |
| <i>Rumex acetosella</i> | R |

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| | |
|---|------|
| <i>Salvinia molesta</i> and <i>S.minima</i> | R |
| <i>Saponaria officinalis</i> | R |
| <i>Setaria faberi</i> | R |
| <i>Sonchus arvensis</i> | R |
| <i>Sorghum halapense</i> | R |
| <i>Stachys balansae</i> | R |
| <i>Thalictrum buschianum</i> | R |
| <i>Trapa natans</i> | R |
| <i>Typha angustifolia</i> | R |
| <i>Ulmus pumila</i> | R |
| <i>Valeriana officinalis</i> | R |
| <i>Verbascum thapsus</i> | R |
| <i>Veronica gentianoides</i> | R |
| <i>Viburnum opulus</i> | R |
| <i>Vinca minor</i> | E, I |
| <i>Vincetoxicum nigrum</i> | R |
| <i>Vincetoxicum rossicum</i> | R |

B. Watch List

These taxa not currently posing a serious invasive risk in the Chicago area, but may do so in the future, particularly as the climate changes. Plan: W= watch and monitor for signs of invasiveness. Addition of Watch List taxa to the collection should be avoided.

| Taxon | Plan |
|--|------|
| <i>Akebia quinata</i> | W |
| <i>Buddleja davidii</i> | W |
| <i>Elaeagnus angustifolia</i> | W |
| <i>Gypsophila paniculata</i> | W |
| <i>Houttuynia cordata</i> | W |
| <i>Quercus acutissima</i> | W |
| <i>Ranunculus lingua</i> | W |
| <i>Spiraea japonica</i> | W |
| <i>Syringa reticulata</i> | W |
| <i>Tamarix ramosissima</i> and other <i>Tamarix</i> spp. | W |
| <i>Verbina bonariensis</i> | W |
| <i>Wisteria sinensis</i> | W |

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Appendix 2: Risk Assessment and Evaluation Protocols

Decision tree for adding non-native plant taxa to the Chicago Botanic Garden collections:

1. If taxon is on the Chicago Botanic Garden Invasive Plant List as “R” or “P”—do not add to collection.
 1. If taxon is not on list, go to 2.
 2. Taxon is already in U.S. and commercially available in the Chicago area -- no risk assessment needed, can add to collection.
 2. Taxon is in U.S. but not commercially available in the Chicago area – perform risk assessment and go to 3.
 2. Taxon has never been introduced to U.S. – perform risk assessment and evaluation and go to 3, then 4.
 3. Taxon passes risk assessment – can add to collection.
 3. Taxon fails risk assessment – do not add to collection **OR** go to 4.
 4. Taxon passes evaluation trial – can add to collection.
 4. Taxon fails evaluation trial – do not add to collection and destroy germplasm.

Appropriate risk assessments include, but are not limited to, Reichard and Hamilton (1997), Randall, et al., (1998), and Western Australia’s Weed Risk Assessment Model. A national risk assessment system is under development and could be used once it is available.

For international plant exploration trips:

Prior to a plant exploration trip, a target list of taxa for collection will be developed. Any species, or cultivars of species, known to be invasive in the Chicago region (those listed as “R” or “P” in Appendix 1) will not be collected for use at the Chicago Botanic Garden on plant exploration trips. Recognizing the collaborative nature of international plant exploration trips, the Garden will make its policy on invasive species known to its collecting partners. All target taxa will be subjected to an established risk assessment procedure. The plant collector(s), in consultation with the Collections Department, will be responsible for developing the target list and performing risk assessment. The final list will be reviewed by the Invasive Species Working Group.

For purchased plants, seed orders, and U.S. collecting trips:

Any species, or cultivars of species, known to be invasive in the Chicago region (those listed in Appendix 1 as “R” or “P”) will not be purchased, or otherwise obtained, for collections, display, or resale. These taxa may be purchased only for the purpose of research into their invasiveness and if so they will be grown under controlled conditions and carefully monitored to prevent escape. All orders will be checked against the Garden’s Invasive Plant List.

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Appendix 3: Types of documentation

(modified from those of the Southwest Exotic Plant Information Clearinghouse)

Anecdotal: The response to a question is supported only by unconfirmed, anecdotal information. Anecdotal includes newspaper articles, third party information, or information from a non-qualified professional.

Observational: The response to a question is supported by little published information, but confirmed, not-yet-published observations are available from a qualified professional (as accepted by the Invasive Plant Committee). This definition is expanded to include inference based on the evaluator's review of the literature (reviewed scientific publication or other published material) or based on the evaluator's personal observation and general scientific principles. Inference is identified as the level of documentation when a particular observation or experimental result is not available for the species under evaluation, but some degree of deductive logic can be used to arrive at a reasonable conclusion that enables the evaluator to respond to the criteria question with something other than “unknown”.

Other published material: The response to a question is supported by reports, non-peer-reviewed documents, etc. Includes documents such as agency reports, technical reports, in-house documents, conference proceedings, fact sheets, element stewardship abstracts, theses, and dissertations, and books covering numerous invasive plants that may be edited but whose individual contributions are not peer-reviewed. If the only source of information is an overview or synthesis type of article, then this is stated in the rationale and the level of documentation is “other published material” unless the original citations are actually reviewed by the evaluator him/herself (in which case the documentation level would be “reviewed scientific publication”). Even if it is a book or synthesis article (often both are considered peer-reviewed), it is still “other published material” because the evaluator is relying on the author's understanding and interpretation of the original literature. If authors of other published material indicate they are inferring something based on observation and general scientific principles, then it is stated as such and observational is the correct level of documentation.

Reviewed scientific publication: The response to a question is supported by published, peer-reviewed scientific evidence. If the author(s) includes in the manuscript possible explanations (even though this may not be the particular research question being addressed) or an observation as a result of the covered research and this manuscript is peer-reviewed, the appropriate documentation level is reviewed scientific publication. If authors indicate they are inferring something based on observation and general scientific principles, then it should be stated as such in the rationale and reviewed scientific publication is still the correct level of documentation. The assumption is the peer-reviewers have confidence in the author's conclusions or speculations.