

Your Garden's Impact for Research: Uses, Tracking, and Getting Credit

Collecting & Conserving

11:00 – 12:00 PM

Tuesday, 18 June 2019



Themes:

1. External requests and handling
2. Use of collections for research
3. Promoting your garden's work and getting credit
4. Development of standards and tracking collections use



Participants:

Panelists

- Phil Douglas – Chicago Botanic Garden
- Michael Dosmann, Ph.D. – Arnold Arboretum & Harvard University
- Cindy Newlander – Denver Botanic Gardens
- Raquel Folgado, Ph.D. – Huntington Library, Art Collections, & Botanical Gardens
- Abby Meyer – BGCI US

Moderator

Morgan Gostel, Ph.D. – Botanical Research Institute of Texas



External Requests and Handling

Phil Douglas

Director of Collections

Chicago Botanic Garden



Development of Documentation Standards

- Systematic approach to documenting and verifying living collections.
- Living plant- Accession tag, display label.
- Herbarium Voucher(s)- to include appropriate morphological characteristics for taxon verification.
- GIS mapping within collection.
- Digital photography- documenting specific morphological traits.
- DNA voucher.
- Completely Documented Accession- Goal



External Requests

- Requests come through direct and indirect routes (email, BGCI PlantSearch, Plant Collections Network).
- All requests for material are documented and tracked using our material transfer agreement (MTA).
- Ensures appropriate use, clearly states benefits-sharing, 'spirit of the CBD'.
- Right to refuse, release of liability.



Handling Requests

- Director of Living Plant Documentation fields and handles all requests
- Appropriate permissions are obtained through curators, Director of Collections, or in some cases Director of the Garden.
- We maintain supplies necessary for packaging and shipping live plants, DNA samples, pollen, etc.
- Developed relationship with state and federal inspectors (USDA, IL Dept of Ag) for phytosanitary inspections.



Engaging your living collections and those who study them

Michael Dosmann, Ph.D.

Keeper of the Living Collections

The Arnold Arboretum of Harvard University



The Arnold Arboretum Story

- Launched Scholar Engagement Initiative (2008)
- What happened:
 - Scholars using the living collections increased from fewer than 25 to over 80 each year (and they keep returning)
 - Plants studied increased from ~300 to ~1500 annually
 - Projects diversified to span the traditional to the extreme; from the plants to the environments and other organisms within



Why we did it...

- Institutional mission
- Societal obligation
- Demonstrate (and expand) collections' relevance at a pivotal juncture
- Add new value to existing collections



How we did it... and you can, too

- Be open minded: Broaden your perspective on the scholarly use of collections
- Engage scholars formally & create strong relationships of mutual benefit
- Lighten up! Don't be parochial and stingy





Facilitating Research Use of Living Plant Collections

Cindy Newlander

Associate Director of Horticulture
Denver Botanic Gardens



Material Transfer Agreement

| DENVER BOTANIC GARDENS Material Transfer Agreement Living Collections Access and Distribution Form <small>(Form must be returned for approval at least one week prior to proposed collection date)</small> | |
|--|---|
| User Information (To be filled out by or on behalf of primary user) | |
| <p>Today's Date: <u>10/12/18</u></p> <p>Name: <u>Amy Highland</u></p> <p>Position: <u>Director of Collections</u></p> <p>Organization: <u>Mt. Cuba Center</u></p> <p>Mailing or shipping address: <u>3120 Barley Mill Rd</u> <u>Hockessin DE 17707</u></p> | <p>Proposed Date of Collection: <u>when available</u></p> <p>Telephone #: <u>302-239-8813</u></p> <p>Email Address: <u>aighland@mtcuba.center.org</u></p> |
| <div style="display: flex; justify-content: space-around;"> City State/Country Zip </div> | |
| FedEx Account # (if applicable) redacted | |
| Collection use: Project Description (please attach an addendum if needed) <div style="margin-top: 10px;"> <p>To add genotypes to our conservation and research collections.</p> <p>These plants will be added to a common garden study to assess fitness of ecotypes within the mid-Atlantic region.</p> </div> | |
| <p>Please note any additional requirements/requests for collection or shipping:</p> <p>Original Wild Collected Data: Collected by Dennis Mead, 2007; Adams Co., Colorado, Rocky Mountain Arsenal collected from plants in the Cottonwood Border, Denver Botanic Gardens 9-14-2018</p> | |
| <p>Use/Project Type (check one or more box)</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> Breeding/Hybridization <input checked="" type="checkbox"/> Conservation Research <input type="checkbox"/> Horticultural Display <input checked="" type="checkbox"/> Horticultural Research <input type="checkbox"/> Molecular Research </div> <div style="width: 45%;"> <input checked="" type="checkbox"/> Propagation <input type="checkbox"/> Research (other) _____ <input type="checkbox"/> Teaching <input type="checkbox"/> Other _____ </div> </div> | |
| <p>Is there an intent to commercialize? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (If yes, this will serve as a conditional agreement, with a new agreement drawn up for commercial use)</p> | |
| <p>Plant Records Staff Use Only</p> | |
| <p>Source Number: _____</p> <p>Date entered: _____</p> | <p>Shipment Number(s): _____</p> <p>Staff Contact: _____</p> |

Species Requested: (To be filled out by or on behalf of primary user. Add extra sheets if more species requested.)

| Scientific Name | Accession Number(s)* | Material needed (seeds, stem cutting, leaves, etc.) | Quantity Requested |
|--------------------|----------------------|---|--------------------|
| Vernonia baldwinii | 080293 | seeds | |
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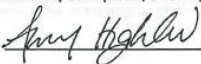
*Please refer to Gardens Navigator to find accession numbers of plants in the living collections. Please note that plants listed as non-public are usually growing in our greenhouse or seed collections. Some plants listed may be growing at our Chatfield Farms or Mt. Goliath sites. <http://navigate.botanicgardens.org/ecmweb/FindPlant.html>

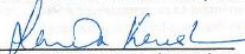
Terms:

Samples are distributed under the following conditions:

1. Samples will be used only for the purposes stated in the Project Description.
2. Samples will not be further distributed to others without prior consent of Denver Botanic Gardens' (DBG) Horticulture Department.
3. Recipient will provide a report to DBG at the end of the project as well as copies of any publications arising from use of DBG samples.
4. Samples are generally distributed for research, display or education. Post-research, if there is intention to commercialize specific plants, a new agreement will be instituted between DBG and the Primary User.

Signatures

Requester: 

Approved by: 

Sarada Krishnan, Director of Horticulture

Date Submitted: 10/12/18

Date Approved: 10/12/18

Submit completed forms to: Horticulture@botanicgardens.org

Edited 8/2/2018



Providing Access to Living Collections

- Give Researchers the Tools to do their work with your Collections
 - BGCI & Gardens Navigator for initial discovery
 - MTA accessible on your website
 - Communication Tool
 - Shipping Information
 - Maps & Inventories
 - Access to Curators and Horticulture Team
- Opportunities for unique studies by visiting researchers
 - Penstemon Scent Study
 - Pollen Collections
- Part of the “Bigger Picture”
 - Images, herbarium vouchers & GGI samples
 - Phenology updates in BG-BASE
 - Public communication



Scent Studies of the Gardens' Penstemon Collection

June 15, 2017 | **Cindy Newlander** |

The Gardens is more than just a pretty place. Behind the paths and petals, there is research going on both inside the gates and beyond. Due to more international communication through Botanic Gardens Conservation International's (BGCI) PlantSearch and the ability of researchers to find out about... [Learn more](#)



Tracking & Gathering the Results

- Tracking in BG-BASE Shipments Table
 - 5 “W’s” – who, what, where, when & why
 - Data from MTA
- Results
 - “Recipients will provide report to DBG at the end of the project as well as copies of any publications arising from use of DBG samples”

SHIPMENTS (BG-BASE) - 2 pages - [SHIPMENTS_ENTRY_1]

File Edit Browse Configure Multimedia Window S/List Shortcuts Help

CST 18 DEC 18 CST 18 DEC 18

Vernonia baldwinii

Code 351

Source of material being shipped

Lot num* Amt left Acc num* 080293 Acc num qual

Name num* 38125 Spec num Spec barcode

Name

Recipient information

Invoice num Invoice note

Recipient num 2754 Recipient Mt. Cuba

Recip acc num

Contact name Amy Highland

Material sent

Sent num Batch num

Sent type G distributed

Sent date D 12 OCT 2018

Code* >... Sent how

SD seed

Next steps:

- Complete compound identification and more detailed analysis
- Sample more species, especially closely related species pairs
- Track specific compounds through the phylogenetic tree, e.g. linalool where we know some of the ecological and evolutionary significance for *P. digitalis*

Acknowledgments

Much thanks to Barrie Portocarrero



If you grow it, document it and make it accessible, researchers will come...



- Make your collections discoverable through BGCI and other online methods
- Develop a Material Transfer Agreement form and make it available
- Track and share your collections' research impact

Cindy Newlander
newlandc@botanicgardens.org





The Huntington

Use of collections for research: Cryopreservation Program

Raquel Folgado

Huntington Library, Art Collections, &
Botanical Gardens

San Marino, California



Cryobiotechnology Research at The Huntington might have a positive impact to other Botanical Gardens in the Americas



Collaborations are key



Cryobiotechnology at HBG

Shoot tips

- Aloes
- Agaves
- Avocados
- Magnolias
- Oaks

Seeds

- Cacti
- Orchids

Embryos

- Cycads
- Magnolias
- Oaks

Pollen

- Avocados
- Cycads

- Garden in a frozen state
 - Research to provide protocols for long-term conservation of plants
 - Secure the diversity
- Spread the word
 - Share knowledge and technologies with other professionals



Promoting your garden's work and getting credit

Abby Meyer, Executive Director

Botanic Gardens Conservation International, U.S.



**BOTANIC
GARDENS**
CONSERVATION
INTERNATIONAL



Living Collections



Botanic gardens
collectively protect
over 40% of known
threatened species
(Mounce et al 2017)



PlantSearch

Welcome to PlantSearch!



English (EN) | [En Español \(ES\)](#) | [日本語で \(JA\)](#)

The only global database of living plant, seed and tissue collections:

- Search 1,321,861 collection records, representing 533,991 taxa, at 1,087 contributing institutions
- Locate threatened, rare, medicinal and other plant species in living collections

• Connect with living collections to aid your conservation, education and research efforts

Enter search criteria below (all fields optional)

Scientific name: ☐ Exclude cultivar names
Genus Species Intraspecific Epithet

Conservation Status:

IUCN Red List -- Please Select -- Additional Status: Crop Wild Relative -- Please Select --

IUCN Red List 1997 -- Please Select --

☐ CITES listed species

☐ Threatened Global Trees Campaign species

Which IUCN list should I choose?

| # | Plant Name | Name Status | IUCN Red List | IUCN Red List 1997 | CITES Appendix | Invasive Species Compendium fact sheet | CWR | No. of ex situ sites worldwide | Contact ex situ sites |
|----|--|--------------------------|--|--------------------|----------------|--|-----|--------------------------------|------------------------------|
| 1 | Abies alba | - | Least Concern | - | - | Look Up | - | 128 | Send Request |
| 2 | Abies amabilis | - | Least Concern | - | - | Look Up | - | 49 | Send Request |
| 3 | Abies balsamea | Accepted | Least Concern | - | - | Look Up | - | 115 | Send Request |
| 4 | Abies balsamea var. balsamea | Synonym | Least Concern | - | - | Look Up | - | 6 | Send Request |
| 5 | Abies balsamea var. phanerolepis | - | - | - | - | - | - | 1 | Send Request |
| 6 | Abies beshanzuensis | Accepted | Critically Endangered | - | - | - | - | 1 | Send Request |
| 7 | Abies bracteata | Accepted | Near Threatened | Rare | - | Look Up | - | 27 | Send Request |
| 8 | Abies cephalonica | Accepted | Least Concern | - | - | Look Up | - | 103 | Send Request |
| 9 | Abies h. cephalonica | - | Lower Risk Near Threatened | - | - | - | - | 0 | Send Request |
| 10 | Abies chensiensis | Accepted | Least Concern | - | - | - | - | 31 | Send Request |
| 11 | Abies chensiensis ssp. chensiensis | Synonym | Least Concern | - | - | - | - | 0 | Send Request |
| 12 | Abies chensiensis subsp. salouenensis | Accepted | - | - | - | - | - | 9 | Send Request |
| 13 | Abies chensiensis ssp. yulongshanensis | Accepted | Least Concern | - | - | - | - | 0 | Send Request |



PlantSearch requests

Request information on plant species

INTENDED USE: This service is designed to facilitate communication between plant collection holders, researchers, educators, and other plant conservation professionals. Its primary use is to request or share information or plant material for research, education or conservation purposes.

To send a request about the plant you selected to all gardens that report maintaining it in their collections, please complete the form below as thoroughly as possible.

Please note that BGCI is not responsible for the accuracy of the information contained here, nor is it directly involved with or responsible for the response of individual gardens to your inquiry.

Information requested for plant: **Abies alba**

Your Name:

Email:

Job Title:

Institution:

My institution is a member of BGCI ☐

Please indicate the purpose for your request (check all that apply):

- ☐ Plant tissue for DNA analysis or other research purpose
- ☐ Seeds or other living material for conservation, education, or research purposes
- ☐ Propagation or cultivation information for conservation, education, or research purposes
- ☐ Other (please provide additional details in the Comments box below)

Comments/Additional Information:



M. Wenzel



BGCI Accreditation Scheme

Distinguishes botanic gardens and recognizes achievements in plant conservation.



Plant Conservation Scientific Research

| | Target | Examples of Evidence |
|----|--|--|
| 32 | The botanical institution is an acknowledged, formal participant in scientific research on plant conservation. | Peer reviewed papers acknowledging support from the botanical institution. Peer reviewed papers written by visiting scholars, professionals, etc... to the botanical institution. |
| 33 | The botanical institution's staff publish original research on plant conservation. | Peer reviewed papers written by botanical institution's staff. |



Plant Conservation and Biodiversity Benchmarking



American
Public Gardens
Association



BGCI
Plants for the Planet

publicgardens.org/benchmarking-studies

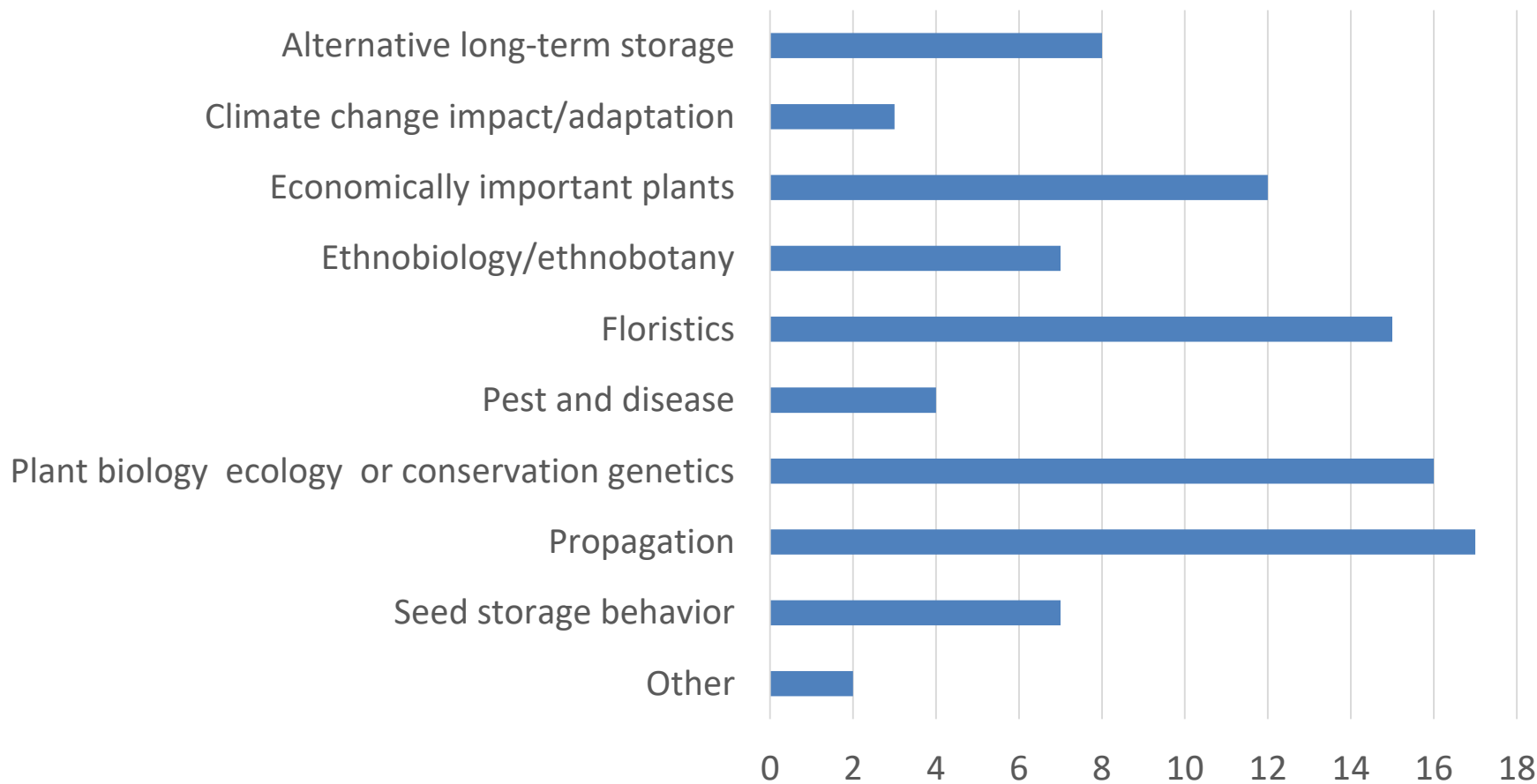


Five core topic areas:

- Leadership & Governance
- Ex situ Conservation
- In situ Conservation
- Research & Expertise
- Education & Communication



Research areas supported by North American botanic gardens





Pilot phase complete

Audience

All North American gardens

Next Call for Data

Summer/Fall 2019

To Support

North American Plant
Conservation Strategy update

publicgardens.org/benchmarking-studies

In partnership with



UNITED STATES
BOTANIC GARDEN

**THRIVE
TOGETHER**
DIVERSITY GROWS GARDENS

American Public Gardens Association
Annual Conference
June 17-21, 2019





Aim: to facilitate integrated conservation (in situ and ex situ) of exceptional species (e.g. *Rhododendron*, *Magnolia*, *Quercus*, *Camellia*, *Acer*, *Dipterocarpaceae*) to prevent their extinction in the wild and to provide sources of material for conservation and research.



Annual Reporting

SCIENCE

2018 YEAR IN REVIEW

Biodiversity is fundamental to life, from the air that we breathe to the food that we eat. The scientific study of biodiversity is the foundation of botanic gardens as it allows us to conserve diversity at home and around the world through greater documentation and understanding. Thus, science serves as a key programmatic element at Denver Botanic Gardens.



DENVER BOTANIC
GARDENS

ON THE COVER

Gardens mycologist examining a specimen during a foray

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Rehousing our collections

2018 marked the beginning of construction on the long-awaited Freyer – Newman Center. The Center will allow the Gardens to celebrate the intersection of science, art and education. The Institute of Museum and Library Services awarded us nearly \$250,000 to enable **world-class stewardship of the non-living collections** — natural history, art and archives — that underpin and enable this intersection. 2019 will be a year of intense preparation for our early 2020 move into the Center.

Staff working in the current natural history collections



Panelist discussion

1. External requests and handling
2. Use of collections for research
3. Promoting your garden's work and getting credit
4. Development of standards and tracking collections use

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