"Cultivating Discoveries"
MBC Research, Collections and Horticulture Strategy: 2013-2018

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December 14, 2012

Adopted by:

The MBC Board of Directors

March 15, 2013

When research ceases, the facility, of whatever kind, retains only historical and curiosity value, and all concerned tend to look backward only. The backward look is essential for enrichment and the understanding to be derived, but without the ability to look and move forward through active research, we make no progress. (A.H. Miller, 1963)

The garden exists between the collecting expedition and the mulch pile only by the intensive input of specialized resources. (Attributed to Q. Cronk, ca. 2005)

I am trying to make my collection as complete and credible as climate and finances and time permit. (Col. R. H. Montgomery, 1939)

BASIC STRATEGY STATEMENT

To integrate Montgomery collections, research and horticulture operations in a manner that produces meaningful, tangible outcomes at all phases.

INTRODUCTION

This document presents a 5-year strategic plan, covering 2013-2018.

Collections development, collections management, research, and horticulture are at the core of the MBC mission, and have a long history. The previous page features good quotes which illustrate the necessity of ongoing collecting, horticulture, and active research, including succinct statement found in the Colonel's Memoirs.

The plan below illustrates how MBC will maintain its current prominence in collections, achieve greater advancement of this mission through research, and will further integrate these activities with horticulture operations.

GUIDELINES

The strategy is based on MBC strengths and assets (see Appendix). Guidelines are to:

1. Maintain and increase the diversity and depth of our living collections, focused on historic strengths, through dedicated fieldwork.
2. Increasingly align fieldwork collecting operations to conservation and research projects directed at **tangible outcomes** (i.e. measurable progress such as publications). Through research, produce new botanical information from field and collections studies, as well as new models and standardized protocols.
3. Increasingly align horticulture operations to formalized controls and data collection for research.
4. Maintain and increase productive collaborations with research partners.
5. Seek novel sources of support for the activities above.

EXAMPLE CASE: *Zamia decumbens*

One of the best models of integrated research, collections development, and horticulture, producing multiple outcomes, is Montgomery's work with *Zamia decumbens*:

- Review of collections and herbarium specimens prompted fieldwork in Belize in 2008.
- This fieldwork was externally funded through the AZH.
- This fieldwork produced many living collections and data for MBC.
- The data led to a new species description in 2009.
- Further collections were made in 2010, in anticipation of further studies.
- IMLS funding in 2012 allows for the conservation genetic analysis of the living collection.

Thus, referring back to the Guidelines on page 2, this work meets at least 4 of the 5 Guidelines. Living collections fieldwork (1) was fully integrated with research leading to **tangible outcomes,** in this case at least two scientific papers on *Zamia decumbens* (2). All work with *Zamia decumbens* has been externally funded through grants (5), and done in collaboration with research partners (4). Current analysis will help develop useful protocols for the community (2).

A further improvement upon this work would be to develop horticultural research (3) based on the propagation and care of *Zamia decumbens*, as has been recently done for other living collections at MBC.

Thus, as in this example, strategic areas listed in this plan will seek to fulfill the guidelines on page 2.

STRATEGIC AREAS FOR PALM COLLECTION, 2013-2018

Highest Priority: Area 1. *Attalea, Syagrus, Butia* and relatives: biogeography and taxonomy.

Guideline 1. Fieldwork in Bolivia, Brazil, Ecuador, Guadeloupe, Peru, Suriname, French Guiana, in areas not yet collected (see map 1)
Guideline 2. Description of new species. Revision of *Syagrus*. Revision of *Attalea*. Revision of *Butia*. Phylogenetics of *Syagrus* (with USDA).
Guideline 3. Protocols for germination of *Attalea*.
Guideline 4. Collaboration with USDA, Fairchild, Instituto Plantarum, and others.
Guideline 5. Funding to be obtained externally. NSF proposal is in preparation.

Medium Priority: Area 2. Palms from areas of similar latitude, weather, and soils.

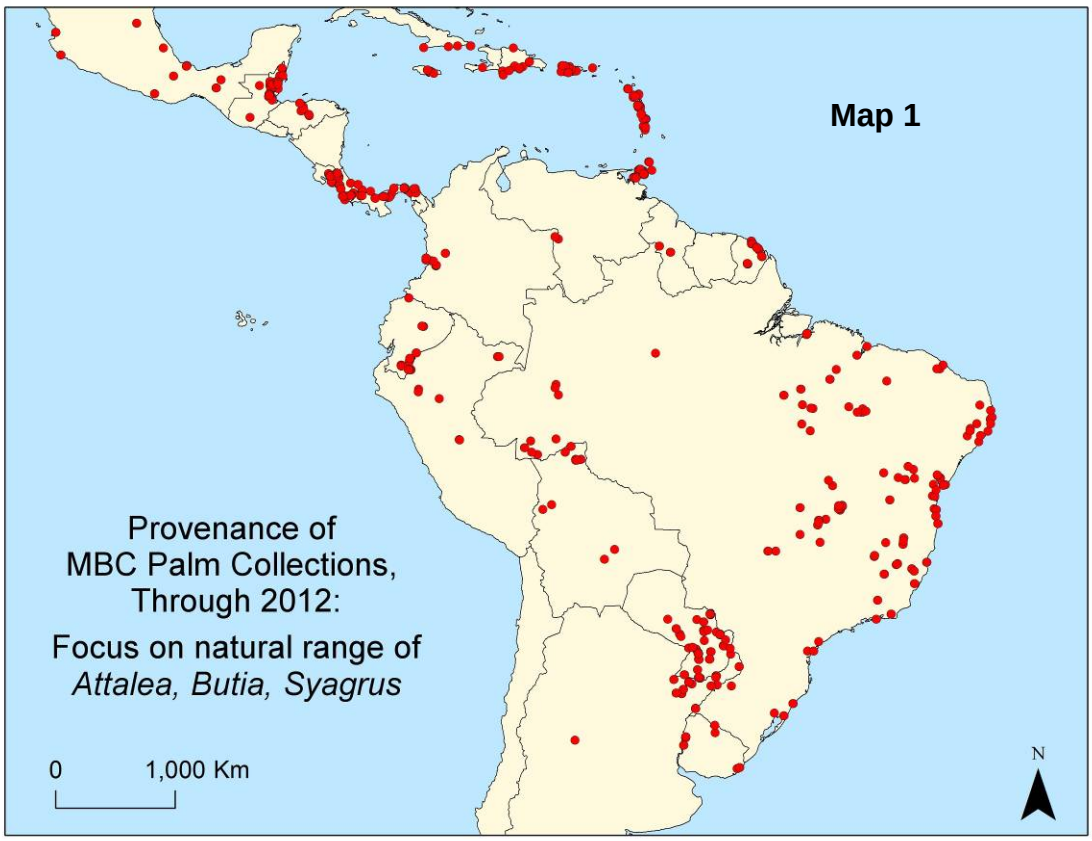
Guideline 1. Fieldwork in areas not yet collected (see map 2):

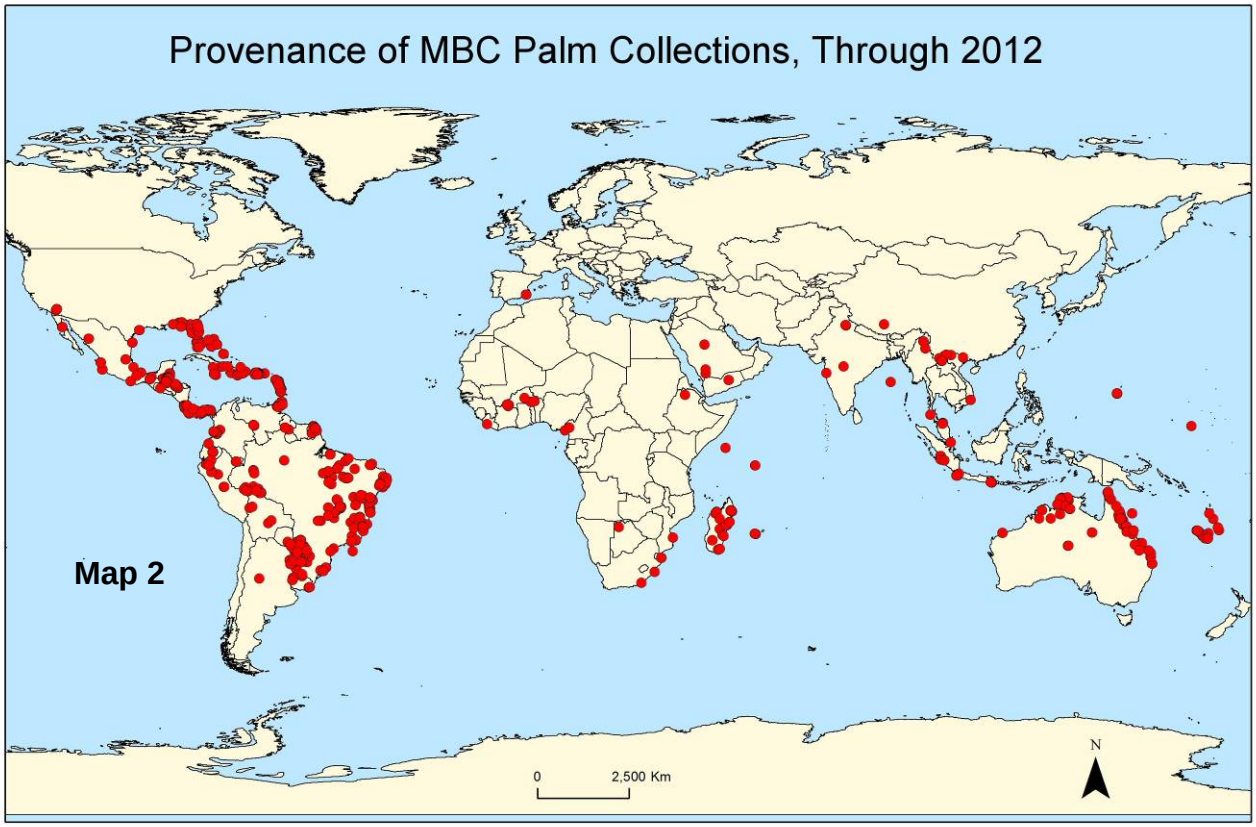
- Dominican Republic, Haiti, and Dominica to collect *Pseudophoenix, Zombia antillarum, Calyptronoma plumeriana, Calyptronoma rivalis, Coccothrinax gracilis*.
- Cuba to collect *Copernicia, Coccothrinax* and *Roystonea.*
- Fiji and Vanuatu to collect *Veitchia*.
- Puerto Rico to collect *Gaussia*.
- Thailand to collect *Johannesteijmannia, Kerriodoxa, Licuala, Metroxylon, Oncosperma*, and *Rhapis.*
- Vietnam to collect *Areca, Arenga, Borassus, Caryota, Corypha, Licuala, Livistona*, *Phoenix*, and *Rhapis.*

Guideline 2. Ongoing population genetic studies in *Pseudophoenix*. Other popular articles, including articles for PALMS.
Guideline 3. Protocols for successful cultivation of *Pseudophoenix* and SE Asian and Australian palms in Florida.
Guideline 4. Collaboration with local partners including Nong Nooch, FTBG, Cayes BG, JBSD, UPR, National Herbarium of Cuba.
Guideline 5. Funding to be obtained externally.

Other Priority: Area 3. Other potential opportunities in palms.

Guideline 1. Fieldwork in Indonesia, Micronesia, Ivory Coast, and Seychelles, in areas not yet collected (see map 2).
Guideline 2. Ongoing taxonomic and biogeographic studies. Comparative biology. Anatomical studies. Other popular articles.
Guideline 3. Formalized protocols for cultivation.
Guideline 4. Collaboration with local partners and international partners, including Conservatory Ville de Geneve, Jill Menzel.
Guideline 5. Funding to be obtained externally.


Map 1
Provenance of
MBC Palm Collections,
Through 2012:
Focus on natural range of
Attalea, Butia, Syagrus
0
1,000 Km
N


Provenance of MBC Palm Collections, Through 2012
Map 2
0
2,500 Km
N

STRATEGIC AREAS FOR CYCAD COLLECTION, 2013-2018

Highest Priority: Area 1. *Zamia* biogeography, taxonomy, and conservation studies

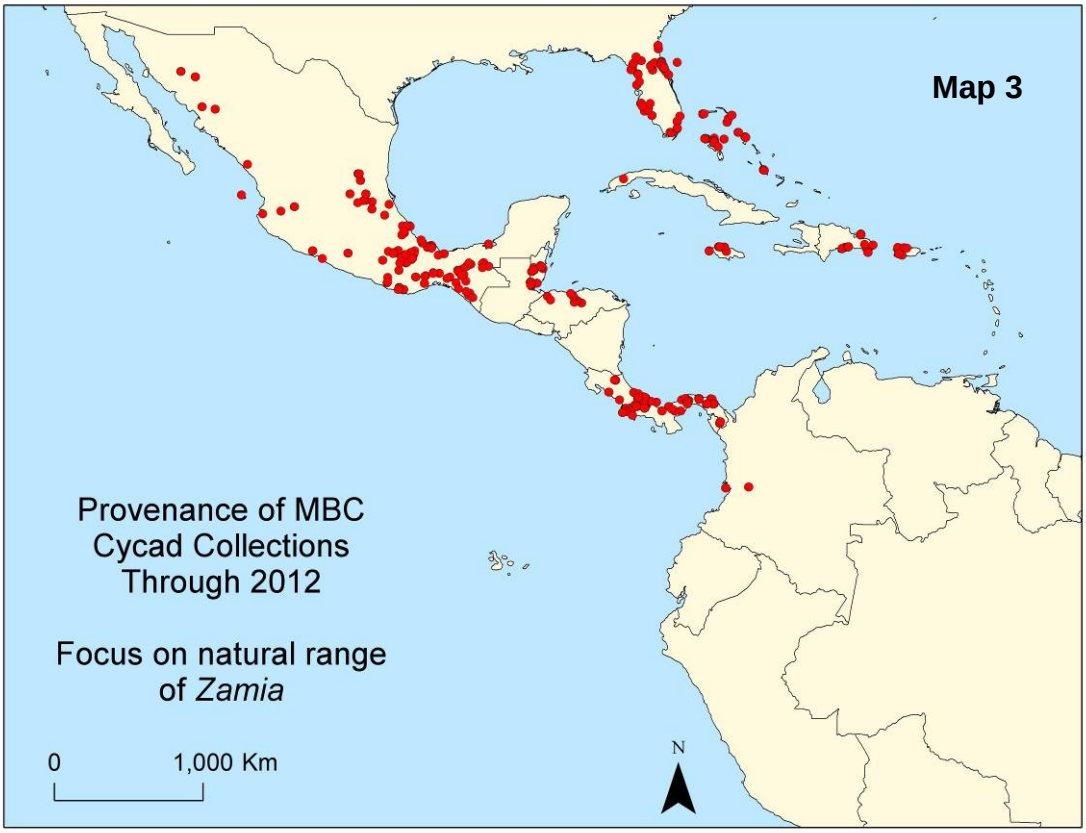
> **Guideline 1**. Fieldwork in Cuba, Belize, Puerto Rico, Costa Rica, Guatemala, Honduras, Nicaragua, Colombia, and Venezuela, in areas not yet collected (see map 3).
> **Guideline 2**. Population genetics of *Zamia decumbens*. Description of new species. Revision of *Zamia*. Conservation genetics and phylogenomics of Caribbean Zamia.
> **Guideline 3**. Protocols for propagation and cultivation of *Zamia*.
> **Guideline 4**. Collaboration with USDA, Fairchild, University de Antioquia, and others.
> **Guideline 5**. Funding from NSF, IMLS, and also to be obtained externally.

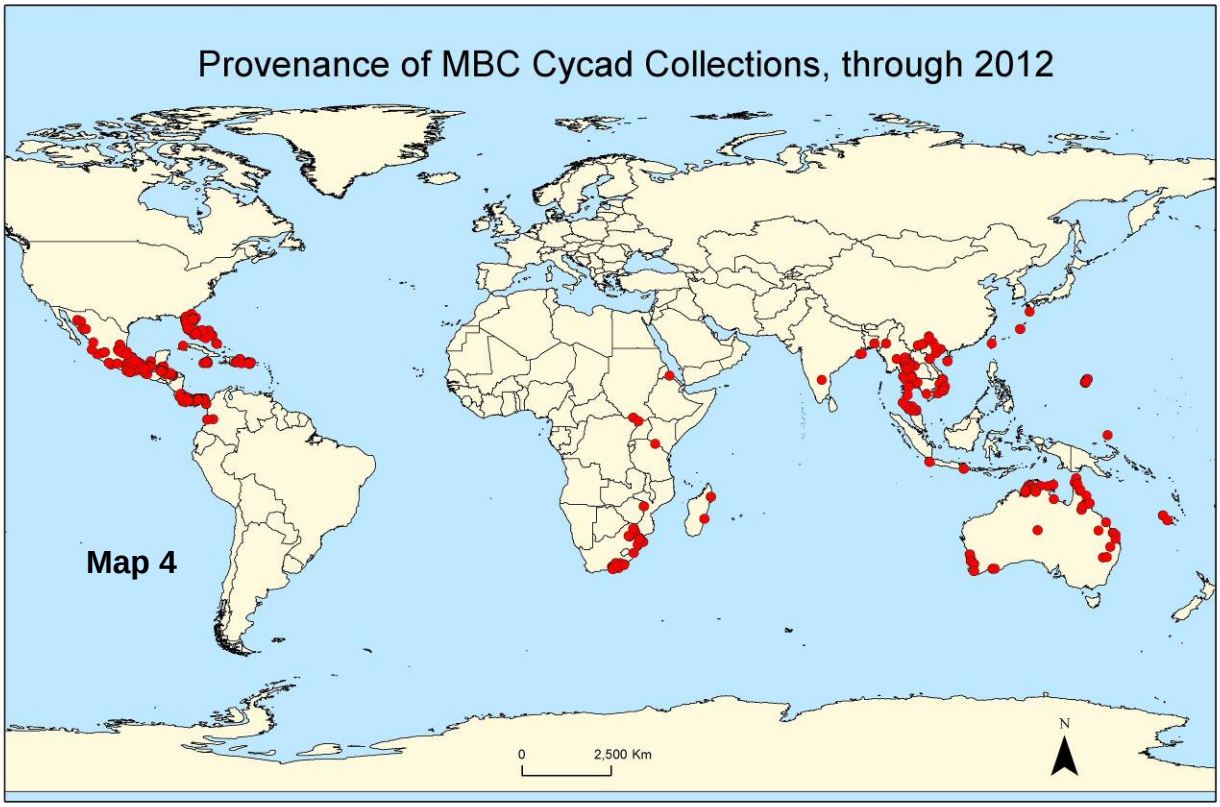
Medium Priority: Area 2. Poorly represented *Zamia* and *Ceratozamia* at MBC, feasible in South Florida.

> **Guideline 1**. Fieldwork in Cuba, Cayman Islands, Guatemala, Honduras, Nicaragua, and Mexico, in areas not yet collected (see map 4).
> **Guideline 2**. Description of new species, biogeographic studies
> **Guideline 3**. Protocols for propagation and cultivation
> **Guideline 4**. Collaboration with international collaborators.
> **Guideline 5**. Funding to be obtained externally.

Other Priority: Area 3. Other opportunities for cycad collections.

> **Guideline 1**. Fieldwork in Uganda, China, and Australia, in areas not yet collected (see map 4).
> **Guideline 2**. Cycad Anatomy Research. Conservation assessments. Comparative biology.
> **Guideline 3**. Protocols for propagation and cultivation.
> **Guideline 4**. Collaboration with international collaborators, including Shenzhen Fairylake Botanic Garden, and Tooro Botanic Garden.
> **Guideline 5**. Funding to be obtained externally.


Map 3
Provenance of MBC
Cycad Collections
Through 2012
Focus on natural range
of *Zamia*
0
1,000 Km
N


Provenance of MBC Cycad Collections, through 2012
Map 4
0
2,500 Km
N

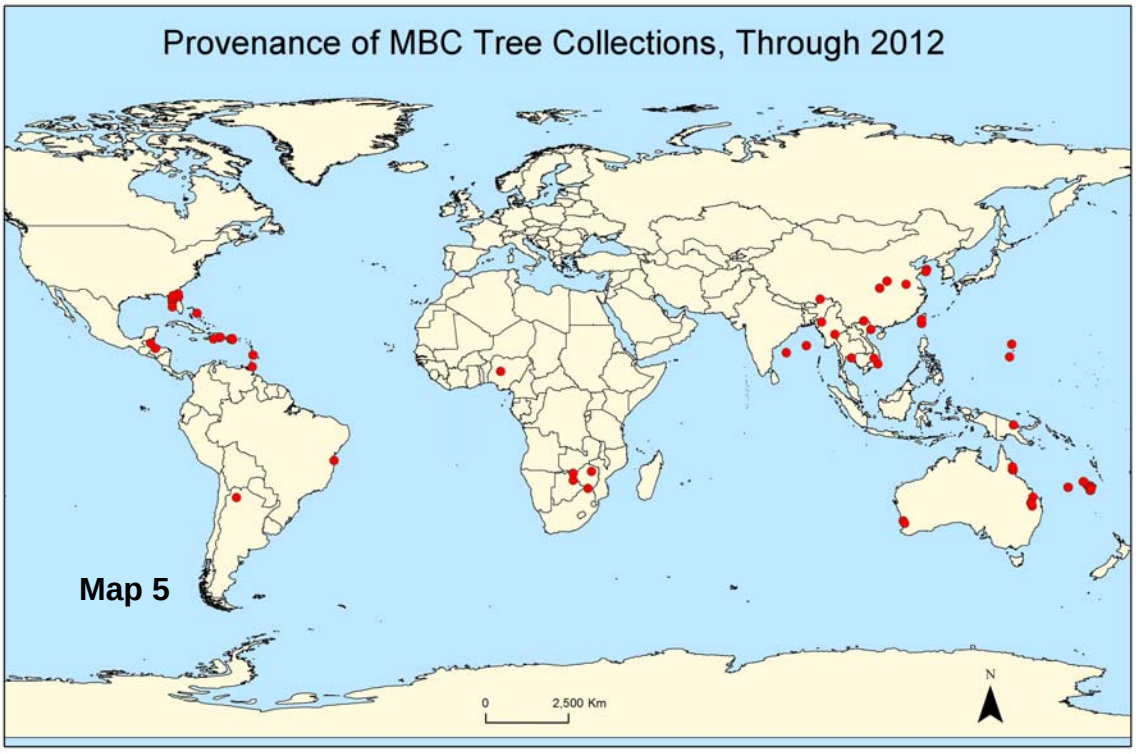
STRATEGIC AREAS FOR CONIFER COLLECTION, 2013-2018

Priority: Area 1. *Podocarpaceae* and *Araucariaceae* species most adaptable to the South Florida climate: Interspecific and infraspecific diversity

Guideline 1. Fieldwork in Dominican Republic, Hainan Island (China), Vietnam, Panama, New Caledonia and Brunei, in areas not yet collected (see map 5). Exchanges with Royal Botanic Garden Edinburgh, Dr. Patrick Knopf (Germany), Dr. Tim Brodribb (Tasmania) and other partners.
Guideline 2. Conservation research on New Caledonian conifers, analysis of relationships between native altitudinal range and adaptability to lowland South Florida conditions. Documentation of adaptability to high pH soils in relation to soils in countries of origin.
Guideline 3. Protocols for vegetative propagation, container media and fertilization.
Guideline 4. Collaboration with USDA, Fairchild, JBSD, Atlanta Botanical Garden, Royal Botanic Garden Edinburgh, Bochum BG, Singapore BG, Conservation International, the New Caledonian Agriculture Institute and UC Santa Cruz Arboretum.
Guideline 5. Funding to be obtained externally.

Other Priority: Area 2. Other warm climate conifers suitable for MBC conditions.

Guideline 1. Fieldwork in Haiti and Vietnam (Cupressaceae) in areas not yet collected (see map 5). Exchange with the arboretum of Dr. Zsolt Debreczy (Hungary)
Guideline 2. Assessment of conservation status of a highly restricted *Juniperus* in Haiti
Guideline 3. Protocols for vegetative propagation, container media and fertilization
Guideline 4. Collaboration with Cayes BG and Vietnam Institute of E. and Bio. R.
Guideline 5. Funding to be obtained externally.



PATH FORWARD

Here, eight ongoing, integrated strategic areas are identified as part of this strategic plan. Two of these strategic areas are assigned the highest priority:

- Taxonomy and biogeography of *Syagrus*, *Attalea*, and *Butia*
- Taxonomy and conservation of *Zamia*.

The remaining six strategic areas will be advanced as secondary priorities.

Each year from 2013-2018, as part of the Goals Process, specific targets aligned with this plan will be set as funding, permitting, and resources allow.

Emphasis will be given to goals which meet multiple guidelines and produce tangible outcomes.

At the end of each year, these targets will be evaluated, and operations further aligned to produce outcomes.

By 2018, Montgomery will have produced a significant number of tangible outcomes in research, collections development, and horticulture. This will advance Montgomery's reputation for excellence in living plant collections.

APPENDIX. ASSETS, STRENGTHS AND CONSTRAINTS SUPPORTING AND INFORMING THIS STRATEGY

1. Mission Statement

The mission of MBC is to advance science, education, conservation, and horticultural knowledge of tropical plants, emphasizing palms and cycads, and to exemplify excellent botanical garden design. Through this mission, MBC endeavors to make the Montgomery name known and respected throughout the world in the field of plant science.

MBC carries out its mission by collecting seeds from wild populations of palms and cycads from around the world. MBC then germinates these seeds in its nursery and grows the resulting plants in population-based, documented, scientific collections in its extensive garden pursuant to excellent botanical garden design. MBC fosters and participates in scientific research by collecting and maintaining scientific data on its collections, making its collections and scientific data available to scientists for research purposes, and disseminating this research and data through scientific and popular publications. MBC cooperates with many botanical institutions and countries around the world by making its plant collections, knowledge, and expertise available to their scientists, educators, and students. MBC staff also explain the mission and operations to the general public through workshops, lectures, publications, and tours of the plant collections.

MBC's well-documented, wild-collected, population-based, tropical plant collections are extraordinary in their scientific, educational, and conservation value—and the botanical garden that contains those collections is extraordinary in its design and beauty.

2. Planting Policy

Mongomery's plant collections must comply with the following four core principles:

1. Plants must have scientific, conservation, and/or educational value;
2. Have a reasonable chance of growing on the property;
3. Be maintained following exemplary horticultural practices; and
4. Be incorporated into the collection in an aesthetically pleasing landscape design.

3. Collections Development

MBC's collections development has three constraints of scope:

- **Taxonomic.** The taxonomic scope is primarily palms and cycads, with a secondary focus on conifers.
- **Geographic.** The geographic scope is primarily the New World, with a secondary focus on opportunities elsewhere.
- **Feasibility.** The feasibility scope takes into account limitations of access, and survivability in the south Florida climate and MBC landsite, in accordance with our planting policy.

MBC also has a robust collections policy which details the priorities for plants brought into the collection (i.e. wild-collected, population-based material). MBC also has an international fieldwork and collaboration policy. This Strategic plan strictly follows those MBC policies.

2. Research

MBC research outcomes demonstrate 4 current areas of strength:

- **Taxonomy:** discovery and description of new species; revision of groups.
- **Biogeography:** plant exploration which advances knowledge of where and how palms and cycads occur.
- **Conservation and Conservation Horticulture:** methods and protocols for ex situ plant collections, including horticulture, conservation and rarity assessment.
- **Comparative Biology:** exploring patterns in diversity, using the living collections.

3. Horticulture

MBC horticulture work includes the following established operations:

- **Nursery:** initial propagation of wild-collected material for conservation collections.
- **Grounds Collection:** siting, planting and care of living collections.
- **Data management:** mapping, labeling and data stewardship.
- **Landscaping:** proper presentation of the collections, and development of the landsite and planting plan.

4. Palm collecting philosophy

Palms encompass about 2,800 species, and are pantropical and subtropical. MBC will primarily seek palm genera that have 1) strong representation of research depth at MBC, 2) those that will grow in S. Florida, i.e. places of similar latitude and soil, and 3) those that are from hurricane and cyclone prone areas. Palms that do not fit these categories will be obtained as a secondary goal as opportunities arise.

5. Cycad collecting philosophy

Cycads encompass about 330 species, and are limited in distribution to relictual populations in the tropics, with some subtropical distribution. MBC will primarily seek cycad species genera that have 1) strong representation of research depth at MBC, or are of research interest to MBC's collaborators, 2) with an emphasis on the New World, and 3) those that will grow in S. Florida, i.e. not from savanna or desert habitat. Cycads that do not fit these categories will be obtained as a secondary goal as opportunities arise.

6. Conifer collecting philosophy

Conifers encompass about 630 species, with over half native to the tropics. Many tropical conifers have restricted, often relictual, distributions. The conifer collection is a secondary emphasis at MBC, and is more synoptic, rather than populational, in nature. The MBC conifer collection continues the tradition of Colonel Robert Montgomery and his conifer collections at Cos Cob and NYBG. This collection has been largely developed via exchange and propagation of collections at partner institutions, with limited direct field collecting by MBC. The collection seeks broad representation of tropical conifer diversity, with emphasis on the tropical families Podocarpaceae and Araucariaceae, many of which grow well at the MBC site and are very poorly represented in botanical collections. Because tropical conifers are so poorly represented in botanical collections and horticulture in the US, MBC also seeks to evaluate which species are most amenable to cultivation and propagation under South Florida conditions.

7. Resources

MBC's collecting plans will require two resources, staffing and funding.

Staffing: Human resources required for MBC's collecting and research plans are in-house, and external collaborators. The in-house staffing is already in place: As our primary collectors and researchers, Larry Noblick and Michael Calonje both have extensive experience and expertise. Chad Husby and Patrick Griffith can occasionally perform fieldwork as available as well. No further hiring will be necessary. External collaborators are also important to our research and collections goals.

Funding: MBC's future research and collecting plans are funded externally through gifts, restricted contributions, and grants. Funding for collecting fieldwork is not difficult to obtain. In recent years, we have had very good success funding expeditions through external sources. As of December 2012, we currently have ca. $212,000 in restricted funds available for near-future research and collecting, raised in recent years. Thus, funding for research and fieldwork is healthy.

8. Scheduling

Scheduling of fieldwork must be flexible. Based on our experience, a rigid scheduling of collecting expeditions beyond one year is difficult, as permitting, contacts, and access are not under our control; conditions in any one place may force a change in plans.

For the next year, the following fieldwork is currently anticipated:

Cuba (Cycads)
Dominican Republic (Palms and Conifers)
Dominica (Palms)
Brazil (Palms)

Scheduling of research can be more precise, and is handled through the goals process.