HSI Conservation Centers 2012
Challenges & Rewards

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What are conservation centers?

- Repositories that maintain accurately identified, documented, and labeled living collections of the 8 families of Zingiberales
- Usually botanical gardens, either privately owned or governmental, or growers & farmers
- All voluntary participants
- Receive no direct funding from HSI
- Currently 11 official CCs worldwide
Why are they important?

- Destruction of the world’s tropical vegetation continues at alarming rates
- Species are being lost before we even have a chance to name and catalog them
- Conservation Centers can play an important role in saving species *ex situ*
- Each Center has unique growing conditions and species it conserves
Conservation Center criteria

- Long-term commitment to conservation
- Maintain accurately labeled and documented collections (tracking numbers, keep accurate records or database)
- Prevent collections from growing together
- Remove spontaneous seedlings
- Herbarium specimens (vouchers) or photos
- Accurate identification
- Permanent records
11 HSI Conservation Centers

- The Botanical Ark, Australia
- Jurong Bird Park, Singapore
- Nong Nooch Tropical Garden, Thailand
- National Tropical Botanical Garden, Kauai, HI
- Lyon Arboretum, Oahu, HI
- Waimea Valley, Oahu, HI
- Fairchild Tropical Garden, Florida
- Wilson Botanic Garden, Costa Rica
- Andromeda Gardens, Barbados
- Zingiberales Gardens, Puerto Rico
- Heliconia Society of Puerto Rico

(8 gardens in different localities)
The Botanical Ark, Mossman, QLD, Australia

- Lowland wet tropical climate
- 12 ha (30 acres)
- 35-110 m (116-363 ft) elevation
- Private collection, CC in 2000
- 3000 spp. tropical fruit trees & economic plants
- Diverse Zingiberales collections, many gingers from SE Asia, also Neotropical Costaceae, Heliconia
The Botanical Ark

- Cannaceae 2 spp., 3 cvs.
- Costaceae 7 genera, 73 spp.
- Heliconiaceae 71 species, 141 taxa incl. cvs.
- Lowiaceae 1 genus, 6 spp.
- Marantaceae 20 genera, 99 species, 107 taxa including cultivars
- Musaceae 2 genera, 27 taxa
- Strelitziaceae 3 genera, 3 spp.
- Zingiberaceae 24 genera, 147 spp. 185 taxa
Jurong Bird Park, Singapore

- Breeding and conservation of rare & endangered birds
- Lowland wet tropical climate
- 20 ha (50 acres)
- CC in 1989

*Heliconia* species & cultivars: 114 taxa, 114 acc.; Cannaceae 1; Costaceae 17 taxa, 18 acc.; Lowiaceae 1 acc.; Marantaceae 23 taxa, 23 acc.; Strelitziaceae 2; Zingiberaceae 20 taxa, 20 acc.

- Hot, humid climate is challenging
- Lowland species thrive best here
Nong Nooch Tropical Garden
Pattaya, Thailand

- Private garden of Kampon Tansacha
- 200 hectares (500 acres), 14 m elevn.
- Lowland tropical, monsoonal
- Formal displays landscaped with palms, cycads,
- Thai cultural & elephant shows
- CC in 2002
Hortus Botanicus conserves diverse Zingiberales & other families

- Concrete containers with drip irrigation, under shade cloth or full sun
- Heliconiaceae 45 spp, 581 acc.
- Zingiberaceae 27 genera, 475 acc.
- Marantaceae 12 genera, 243 acc.
- Musaceae 200 spp./cvs.
- Canna hybridization program
Fairchild Tropical Garden, Coral Gables, FL

- Size 83 acres (33 hectares)
- Lowland humid subtropical
- 2-15 ft. elevation, limestone substrate
- CC in 1995
- Palms and cycads, diverse Zingiberales
Costaceae 4 genera, 28 acc., 23 taxa
Heliconiaceae 73 acc., 60 taxa
Lowiaceae 2 taxa, 2 acc.
Marantaceae 8 genera, 37 acc., 32 taxa
Musaceae 1 genus, 37 taxa, 43 acc.
Strelitziaceae 2 genera, 8 acc.
Zingiberaceae 15 genera, 112 acc., 83 taxa
Wilson Botanic Garden, Las Cruces, CR

12 hectares (36 acres), 1150-1200 m (3775-3940 ft) elevation

Situated in montane wet forest, rich native flora and fauna

Only mid-elevation CC

Part of 235 ha. Las Cruces Biological Station run by OTS since 1973

Former home of Robert & Catherine Wilson

Conservation Center in 1988

Andromeda Gardens, Barbados

- 6 acres (2.4 ha.), humid tropical lowland
- Began in 1954 as a private plant collection at home of Ms. Iris Bannochie
- Now run by Barbados National Trust
- University of the West Indies (UWI) has responsibility for Research and Educational activities
- CC in 1986
- Zingiberales include nice collection of mainly Caribbean Heliconia species & hybrids incl. H. psittacorum varieties
Zingiberales Gardens, PR

- Lowland wet tropical
- 20 acres (8 ha.), elev. 500 ft. (150 m)
- Primarily Heliconia spp. & cultivars
- Conservation center in 2003
- Private garden: Endre Guttman, owner

- 180 Heliconia, 5 Costaceae, 3 Strelitziaceae, 2 Marantaceae, 5 Cannaceae, 11 Musaceae, 40 Zingiberaceae
Heliconia Society of Puerto Rico (HSPR) 8 privately owned gardens

- Conservation center consist of 8 individual private collections
- Different localities in Puerto Rico
- Adds diversity, security
- “Not all eggs in one basket”
Heliconia Society of Puerto Rico

- Number of gardens: 8 scattered throughout the entire island of Puerto Rico
- Size: From 2 acres to 60 acres (0.8 to 24 ha.)
- Elevation: 60 m (200 ft.) to 1140 m (3,800 ft.) above sea level
- Climate: Wet tropical lowlands and highlands
- Rainfall: Variable: 50 in. (110 cm) in E PR to 100 in. (220 cm) in W highlands.
- Became CC in 2007
- Zingiberales collections focus on heliconias, but future plans to include other Zingiberales
- 442 Heliconia species & cultivars in collections, but the actual collections are much more extensive
- Costaceae 26 accessions (mostly Costus)

This conservation center is unique in being the only cooperative unit in HSI.
3 Hawaii conservation centers

- Oahu (Lyon, Waimea Valley)
- Kauai (NTBG)
Lyon Arboretum, S. Oahu

- University of Hawaii system
- 77 ha (193.5 ac.), 36 ha (90 ac.) actively gardened
- 450—1850 ft. (135—555 m) elevation
- CC in 1986
- Lowland wet tropical/subtropical
- Diversity of Zingiberales, palms, other monocots
- Hawaiian native and ethnobotanical plants
- Cannaceae 1 genus, 4 taxa, 14 acc.
- Costaceae 4 genera, 95 taxa (66 spp.), 188 acc.
- *Heliconia* 1 genus, 300 taxa (115 spp.), 425 acc.
- Lowiaceae, 1 genus, 4 spp., 5 acc.
- Marantaceae 21 genera, 340 taxa (200 spp.), 510 acc.
- Musaceae 1 genus, 19 taxa, 25 acc.
- Strelitziaceae 3 genera, 4 spp., 10 acc.
- Zingiberaceae 36 genera, 950 taxa (323 spp.), 1220 acc.
Waimea Valley (North Oahu)

- Founded early 1970’s as private conservation & research garden
- 150 acres (60 ha.)
- Moist tropical/subtropical lowland
- CC in 2002
- Managed by Office of Hawaiian Affairs, City & County of Honolulu, Waimea Arboretum Foundation
Waimea Valley

- Cannaceae: 1 genus, 13 taxa, 21 acc.
- Costaceae: 4 genera, 43 taxa, 47 acc.
- Heliconiaceae: 96 taxa, 173 acc.
- Lowiaceae: 1 taxon, 1 accession
- Marantaceae: 9 genera, 52 taxa, 61 acc.
- Musaceae: 2 genera, 33 taxa, 46 acc.
- Strelitziaceae: 3 genera, 6 taxa, 7 acc.
- Zingiberaceae: 18 genera, 214 taxa, 363 acc.
- **McBryde Garden**—75 ha (186 acres) S Kauai, HQ, most Zingiberales, other research & conservation collections

- **Allerton Garden**—40 ha (100 acres) S Kauai, gardens of beauty & landscape design, some Zingiberales

- **Limahuli Garden**—7 ha (17 acres), N Kauai. Kauai natives and Polynesian ethnobotanical species

- **Kahanu Garden**—50 ha (123 acres), E Maui. Pacific economic & ethnobotanical plants, breadfruit, Maui natives

- **The Kampong**—3.6 ha (9 acres) in Coconut Grove, FL. David Fairchild's former residence. Fruit trees, flowering trees, palms, ornamentals, few Zingiberales
Established in 1964 as a privately supported organization for research, education, and conservation of tropical plants

Only botanical garden in the States chartered by the U.S. Congress

Non-governmental, with no direct state or federal funding

Kahanu Garden, Maui
Breadfruit
Limahuli Garden, Kauai
- Allerton Garden 100 acres (40 ha.)
- McBryde Garden 186 acres (75 ha.)
- 0-130 m elevation
- Moist tropical-subtropical lowland
- CC in 1986
Allerton Garden

- 40 ha (100 acres), oceanfront in Lawai Valley;
gardens of beauty & landscape design
McBryde Garden

- 186 acres (75 ha) in Lawai Valley, on S shore of Kauai
- HQ complex, Botanical Research Center (BRC)
McBryde Garden

NTBG's research & conservation collections

- Native Hawaiian plants
- Pacific island floras
- Ethnobotanical and economic plants
- Special collections--Palms, Rubiaceae, *Erythrina*, Zingiberales
Zingiberales

- Often integrated with other plantings
- Used as ornamentals or for landscape
Zingiberales display areas

- For Garden visitors, including classes, visiting school children, tour groups
- Taxonomic groupings by family
Zingiberales at NTBG

- Cannaceae 8 taxa, 10 acc.
- Costaceae 28 taxa, 53 acc.
- Heliconiaceae 54 taxa, 151 acc.
- Lowiaceae, 1 spp., 5 acc.
- Marantaceae 41 taxa, 44 acc.
- Musaceae 48 taxa, 77 acc.
- Strelitziaceae 5 taxa, 5 acc.
- Zingiberaceae 63 taxa, 101 acc.
Kahanu Garden, East Maui

- Extensive Hawaiian banana cultivar collection
- Unusual ‘Hapai’ or “pregnant” banana
- Genetic sport/mutant of 'Sucrier' or 'Pisang Mas'
Some challenges faced by conservation centers

- Loss of BG funding to maintain collections
- Loss of key staff (retirement, death)
- Mission creep or institutional change of direction or emphasis, no interest in maintaining collections
- Need more mid- to high-elevation CCs
- WEEDINESS! Some Zingiberales have become serious weeds, esp. on islands (Costus, gingers)
- Diseases, pests
Diseases

- Microorganisms not visible to naked eye
- Some carried by plants for long periods without visible symptoms (BBTV)
- May remain viable on clothes or equipment for up to 1 month
- Some can be transmitted by insects (e.g., BBTV by banana aphids)
- May persist in debris & leaf litter for up to 2 years
- There is no cure for most
- Destroy infected plants by burning
Diseases:  Banana Bunchy Top Virus (BBTV), Various fungi (stem rot, leaf spot, etc.) Moko (Bacterial wilt, *Pseudomonas solanacearum*)

Pests:  Scale insects, nematodes, aphids, mealybugs, white flies, ants (tend pests), thrips, spider mites
Recommendations

- Preferably use seeds (e.g., Australia only allows seed to enter)
- Source plants should be healthy, disease-free
- If propagating vegetatively, use rhizome tips
- Clean, inspect, and disinfect rhizomes (chemical dips)
- Have plants inspected by phytosanitary officials in country of origin and upon arrival
- Segregate and quarantine new plants for at least 6 months
- Label your plant material carefully
HSI Student Research Grants

- Small grants program ($500 per grant)
- Supports research projects on any aspect of botany and horticulture of Zingiberales
- Undergraduate, graduate, and post-doctoral students enrolled at recognized universities and research institutions

Phenakospermum guyannense
Mahalo, Gracias, Thank You!