



Living Collections Policy

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Living Collections Policy

I. Why Have a Living Collections Policy?

The purpose of this Living Collections Policy is to guide the National Tropical Botanical Garden staff in the acquisition, documentation, maintenance, and sharing of the living resources which are the basis of our work. It is designed to guide the implementation and integration of the activities which flow from our mission, and to maintain, enhance, and protect the value of our work. As a working document designed to integrate the activities of a dynamic organization, it should be reviewed regularly and modified as needed.

The mission of the National Tropical Botanical Garden is to enrich life through discovery, scientific research, conservation, and education by perpetuating the survival of plants, ecosystems, and cultural knowledge of tropical regions.

Our mission is achieved through:

- A network of diverse gardens and preserves in Hawai`i and Florida, each with significant biological, cultural, and historical resources.
- Conservation, research, and reference collections (living, library, and herbarium) assembled through discovery and collaboration.
- Research in botany, ethnobotany, horticulture, conservation biology, and restoration ecology through programs and institutes.
- Educational courses, publications, lectures, and visitor programs.
- Facilities and infrastructure necessary to conduct this work.

(Adopted October 25, 2005 by the Board of Trustees, National Tropical Botanical Garden)

Staff should carefully select plants that fulfill those purposes and goals that implement this mission, to ensure that we use our resources (time, energy, expertise, land, water, and finances) most effectively. This document outlines the steps that a living plant or propagule follows, through acquisition, accession, record keeping, propagation, outplanting, and other uses. By consistently following these standards and procedures, we will protect and enhance the value that the collections provide for our work in scientific research, education, and conservation.

II. Setting and Implementing Collection Goals

A. Types of Collections (See Appendix A)

NTBG maintains collections of three basic types: economic or ethnobotanical collections, synoptic or thematic collections, and conservation collections which include ecological community level restorations. Important examples of economic or ethnobotanical collections are Polynesian introductions or canoe plants, especially bananas, breadfruit, and taro. Breadfruit is also considered a conservation collection, as it represents considerable crop diversity. Important synoptic collections with a geographic focus are the Polynesian, Micronesian, and other South Pacific collections. Synoptic taxonomic collections include

Areaceae, Rubiaceae, and Zingiberales. Thematic groupings of importance include flowering trees, especially in The Kampong. These collections may be planted in one or several of NTBG's gardens, as appropriate.

Conservation collections focus on plants native to the Hawaiian Islands, including native *Pritchardia* palms, Federally listed endangered species, and particularly the rarest endemics from Kaua'i and elsewhere in the Hawaiian Islands. Conservation collections may be outplanted as traditional botanical garden collections, or in ecological restorations. The focus of ecological restorations is to preserve the elements of native plant communities, rather than individual plant specimens. Common native plants are planted in large numbers in these sites and encouraged to adapt to the site and reproduce. They recreate habitats similar to those once prevalent in Hawaii but now relatively rare and impacted by threats that can be more effectively controlled in the garden or "inter situ" setting. These plant assemblages differ from traditional botanical garden collections, but the tracking and care of rare plants is no less rigorous.

B. Garden Level Collections Policy and Implementation

The Living Collections Policy is to be implemented in all gardens through the procedures outlined below, recognizing that each Garden and each collection or area has purposes and criteria that apply to it particularly. The goals of each collection derive from NTBG's mission and purposes, and should be articulated accordingly within each Garden level plan.

The responsibility for administering, implementing, and interpreting the Living Collections Policy rests with the Director of each of NTBG's Gardens, in cooperation with the Director of Living Collections and Horticulture, and in consultation with the Directors of Science, Conservation, Education, Facilities, Tours and the Breadfruit Institute as appropriate. Each garden Director shall formulate a five-year plan which states the goals of that particular garden's collections, and steps to implement those goals. The Directors will also re-evaluate the collections, and review and revise the goals and procedures that implement the policy on a more frequent basis.

III. Comprehensive Collections Procedures

A. Acquiring Plant Material

Acquisition is the physical entry of a plant into the collection, whether or not the plant becomes a permanent part of the collection via accessioning. Any potential acquisition should be screened and selected in accordance with the purposes of the Collection Policy. All acquired plants should support the criteria set forth in the mission statement and goals of the institution.

1. International Principles on Access to Genetic Resources

In accordance with the NTBG Policy on Access to Plant Genetic Resources and Benefit Sharing (APGR&BS) (Appendix B) NTBG will, in its acquisition of plant genetic resources:

- Obtain prior informed consent, including explanation of how the genetic resources will be acquired and used.
- When acquiring genetic resources from in situ conditions, obtain prior informed consent from the appropriate government authority of the country, state or county of origin, and any other relevant stakeholders, according to applicable law and best practice.
- When acquiring genetic resources from ex situ collections (such as botanic gardens), obtain prior informed consent from the body governing the ex situ collection and any additional consents required by that body.
- When acquiring genetic resources from ex situ sources, whether from ex situ collections, commercial sources, or individuals, evaluate available documentation and, where necessary, take appropriate steps to ensure that the genetic resources were acquired in accordance with applicable law and best practice.

2. Origin

Plant material will be of known wild origin except for cultivars of economic, ethnobotanical, or ornamental plants. The exceptions to this include plants that are high priority species of which no wild source material is available or in restoration plantings where a large number of plants may be grown from second generation seed. Collection data must accompany all incoming plant material. Plants without adequate provenance information will not be accessioned into the living collections (see Plant Records). Taxonomic and genetic (origin of population) status of non-wild plants should be known, where possible. Conservation species of non-wild origin that are horticulturally useful as "expendable" research and educational material may also be accessioned. Collectors offering propagules must provide detailed provenance notes on the Collection Form (Appendix C). Plants received through seed lists, gifts, or purchases must also follow these criteria. Purchasing is discouraged, except for special projects.

3. Applicable Laws

All staff will comply with all applicable state (see Appendix D), federal and international conventions, regulations, laws, and treaties regarding the collection, transportation or distribution of plants. Plant material not obtained in this manner will not be accepted by the National Tropical Botanical Garden. Collections from private properties will be made only with written permission of the appropriate landowner, where possible. Staff will not accept plants known to be obtained or traded illegally. The exception to this is when NTBG takes custody of illegal plant material that has been legally confiscated by U.S. government or international organizations.

4. Screening

Acquisitions should be evaluated on arrival at NTBG for invasiveness and for potential introduction of diseases, weeds, and pests. Quarantine procedures are of utmost importance, especially for stock that may be involved in reintroduction programs.

The plant or propagule must, as far as possible, be free of disease or infestation, and if needed, should be treated accordingly.

Plants should be evaluated by DLCH or his designee on an ongoing basis for their potential to become invasive. NTBG is a signatory of the Draft Voluntary Code of Conduct for Botanical Gardens (Appendix E) as part of its environmental conservation practices.

5. Collaborators

All collaborators including visiting scientists, research fellows, interns, and others, must comply with these procedures. Collaborators must consult with their departmental sponsor or department chair prior to the collection of plant material that is for NTBG or is associated with NTBG. A staff member is designated to be responsible for any accessions made by their collaborators. Compliance with applicable international law, including Convention on Biological Diversity (CBD), the International Treaty for Plant Genetic Resources for Food and Agriculture, the Convention on Trade in Endangered Species (CITES), the US Endangered Species Act, and applicable US Department of Agriculture and Environmental Protection Agency regulations is required.

B. Conservation Collection Methods, Sampling and Ethics

A major role of the National Tropical Botanical Garden is ex situ and in situ conservation of native Hawaiian species. Conservation collections of these sensitive plants must consider the relationship of its Botanic Garden collections to reintroduction and other restoration efforts. A goal of collecting propagules from the wild for the NTBG conservation collections is to acquire founders and representatives from wild populations. It is critical to attempt to collect characteristic material from each plant species over several years to secure the broadest genetic representation of the wild populations. This may be accomplished through careful, intentional collecting from the wild with clear, accurate record keeping.

For conservation collections, an effort will be made to collect representative genetic material from each plant and/ or population. Collections of Federally Threatened or Endangered (T & E), or the Hawaii Plant Extinction Prevention Program (PEPP) plants with populations of 50 or fewer individuals, should be identified with a permanent tag, inconspicuously attached to an adjacent plant. The tag should have a unique number for that plant, the collector's initials and collection number, the date of the field visit, and the

initials of the institution, *NTBG*. Collectors should strive to maintain continuity in identifying each individual over successive field visits. When collections are made, the propagules of each individual plant will be given a unique collector's number, and a unique accession number upon entering the living collections. Vouchers should be made with the collector's unique numbers for herbaria at NTBG and Bishop Museum. In the case of very rare plants a photo voucher should be made showing diagnostic features and printed out for the herbarium.

With larger populations and more common species, an accession number may be assigned to a collection of seeds taken from a representative population.

Ethnobotanical collections may be made of traditional varieties (landraces) representing as broad a base of genetic variation as possible.

C. Accessioning and Record Keeping

The importance of record keeping and accurate data management cannot be overemphasized. A plant to be accessioned must fit within the defined goals and purposes of a specific collection or garden area. The purpose of each collection must be recorded in the Accessions Book. As appropriate, the DLCH may provide a collector with a list of needed plants, and will determine, with a collector, the practical logistics of obtaining them.

Accession Procedure:

1. Each collection or accession will be recorded in the current year's Accession Book with an accession number (ACC #s), and the following information (see Appendix F for sample page):
 - Genus
 - Species
 - Collector
 - Collector #
 - Location Collected
 - Purpose of Collection
 - Propagule Type
 - Propagule Quantity
 - Date of Collection
2. Collectors shall also provide the Curator of Plant Records with a **Collection Form** (Appendix C) (or equivalent format approved by the Curator of Plant Records), with all information required for a complete accession record, including the permit under which the material was collected, if applicable.
3. Plant Records staff will create a new Accession Record in the Living Collection Database representing each new collection or acquisition. Clones of existing collections will be given a new accession number, except for groundcovers or groups

of common plants. Plants grown from F1 seeds will be given a new accession number, and the accession record will reference the parent plant(s).

Plant Records staff will update plant out records when accessions are given permanent metal labels, planted out, die, are distributed to other institutions, or are deaccessioned.

A Plant Records Form (Appendix G) will be completed when an accession:

- is propagated
- is given a permanent metal label
- is included in a proposed plant out
- is planted out in the gardens
- is distributed for planting out elsewhere in an NTBG collaborative restoration or demonstration project
- is deaccessioned for any reason

In accordance with the NTBG APGR&BS, NTBG will maintain these records and mechanisms to: record the terms and conditions, including information on permits or memoranda of agreements (MOAs) under which genetic resources are acquired; track the use of these plant materials within NTBG, and any benefits arising from that use; and record distribution to third parties, including any terms and conditions of distribution. NTBG will report compiled data to relevant agencies as required by law; will make accession information available to cooperating scientists; and will make general information on its collections available to the public.

Geographical information including the Latitude/Longitude or UTM Coordinates of Federally Threatened and Endangered (T & E) plants, which is considered proprietary information by the US Fish and Wildlife Service, will not be included in any public database, to protect plants from unauthorized collection, theft or vandalism.

Requests for plant data information must be made to the Curator of Plant Records (see example of Provenance Report, Appendix H).

D. Germplasm Storage

The purpose of NTBG's Seed Storage facility is to be a repository for the safe-keeping, conservation, and preservation of Hawaiian native plant seeds.

Prior to the storage of the seed the following steps must be taken:

1. *Drying*: (e.g. kept in a container with silica until the seeds have dried to an adequate level; check seeds periodically)
2. *Cleaning*: seeds will NOT be accepted and put into storage unless they have been properly cleaned by the collector
 - No stalks
 - No chaff

- No sediment (sand, soil, etc.)
- No receptacles

Proper cleaning is essential to cut back on unnecessary accessions (when there are no seed present, only chaff), and ease limited storage space

1. Seed Requests

Seed requests from outside institutions/individuals must be accompanied by a completed and signed Plant Distribution Form (Appendix I) with the following information:

- Requestor identification (name, affiliation, and address)
- Satisfactory purpose (namely for research)
- Genus and species requested
- Quantity requested

The Curator of Plant Records may deny requests if

- The information provided is insufficient or inappropriate
- There isn't enough seed in storage to send
- Permits under which the seed was collected preclude distribution

E. Propagation and Nursery Labeling

Requests for propagation will be made by the Project Manager or other appropriate staff, in accordance with the purposes and guidelines of each individual collection or area, on the Plant Records Form (Appendix G). The request should state the genus, species, and, if relevant, the population source desired, the number and size of plants needed, and the date of anticipated outplanting. These requests will be reviewed by the Director of Living Collections and Horticulture (DLCH) or Assistant DLCH and each garden Director (Limahuli, McBryde, Lawai, Kahanu or Kampong), discussed with the Nursery Manager on a regular basis, and adjusted as needed to coordinate the flow of propagation activity in the nursery. Requests must be approved and signed by the DLCH, Assistant DLCH, or the Director of the particular garden.

A Plant Records Form (Appendix G) is also completed by the Nursery Manager when propagation is done. Implementation of the propagation program is the responsibility of the Nursery Manager in each garden. Plants will be moved through the nursery as their cultural requirements dictate. The designated manager of the relevant collection or location will be notified when requested plants are available for outplanting.

Requests for propagation will be considered fulfilled when the appropriate plant material is moved to the Project Outplanting Table in the Nursery. Anyone who moves plant material to outplanting tables must record this, and the information given to the Assistant DLCH. Project managers are responsible for the timely outplanting of materials from their tables. Any replacement of plants will require a new propagation request.

Labeling of nursery plants may be handwritten or machine printed on white plastic tags by a member of the Plants Records staff (see Appendix J-1 for sample). They should contain the information:

- Accession Number (six digits only, no plant numbers)
- Genus, Species and Family
- Location where collected (in the case of F1 progeny, the parent ACC # and locality)
- Collector Name, Collector #, and Date Collected
- Purpose Of Accession/Conservation Status

Groundcover plants which are designated for use in restoration projects may be labeled with one plastic greenhouse tag per tray, if the entire tray is going to one restoration. If the plants are potted up individually and may be used for more than one restoration or garden site, they should have one plastic tag per pot. For ease of labeling and tracking, it is preferable not to combine different ACC #s of the same species in the same flat in the nursery, and to keep individual plants of the same accession together until they are ready for placement on plant out tables. As much as possible, Plant Records staff will facilitate this process by preparing an appropriate number of greenhouse labels for a flat of seedlings prior to the first pricking out and potting up.

F. Micropropagation Laboratory

Micropropagation is another repository form in which plants can be grown and kept *in vitro* for extended periods of time. It is also a method to propagate plants that:

1. Are hard to propagate via traditional methods (i.e. seed, cuttings, grafts, airlayers)
2. Do not or rarely produce seed (e.g. lack of pollinators, sterile cultivar, dioecious)
3. Produce early-aborting seed, or seed with dormancy periods
4. Would not normally grow, by culturing immature seed
5. Require bypassing dormancy, by embryo excision, and culturing on special media
6. Are infested/infected with a pest or pathogen, to obtain clean plants (i.e. species affected by *Erythrina* gall wasp)

It is also used:

1. To obtain large numbers of plants, and/or increase plant populations
2. For commercial or large scale distribution
3. For conservation/preservation (e.g. *Kanaloa kahoolawensis*)
4. To grow plants in an ideal setting free from environmental stresses (i.e. pathogens, pests, the weather, and human or animal disturbances)

NTBG collectors and other employees may request micropropagation of certain plants which fall into the criteria above. Requests for micropropagation of material are to be fulfilled ONLY when there is an approved use for resulting plants. Priority will be given to Hawaii's rare and endangered plants, especially those thought or known to be extinct in the wild. Plants that are easily reproduced through traditional methods are not appropriate for micropropagation, which is a time-consuming and costly process

It is important to notify the lab manager prior to bringing in plant material (a few days to a few weeks ahead) if possible, to allow for research on the plant and preparation of the lab.

The plant material should be fresh. Older material is not likely to respond to culture and may be contaminated via cut surfaces, which makes sterilization difficult.

A micropropagation laboratory for the Breadfruit Institute at NTBG Kahanu will give priority to preserving and propagating breadfruit cultivars.

G. Permanent Labeling of Collections

Labeling must be viewed in a long-term perspective, as many of our collections have been in the garden for decades, and their identity must be preserved with labels if possible despite weathering, natural disasters, and reorganization in the garden. Permanent labeling methods have been researched thoroughly over time to determine the most effective materials to use to ensure longevity. NTBG has invested considerable resources to implement its labeling program, but it will always require the diligence of staff to maintain its effectiveness. Permanent labels eventually deteriorate and should be checked annually and renewed periodically (at least every five years).

Permanent tags are printed by the Plant Records staff through the Plant Out Record within each Accession Record in the database program (see Appendix J-2 for sample). Permanent labels contain the following fields:

- Accession Number
- Plant Number
- Family
- Genus, Species
- Common Name
- Collection Locality (Hawaii, Island, Location)
- Collector, Collector Number
- Type (Wild, Not Wild, F1)
- Conservation Status

Because this creates an addition to the Plant Record, permanent labels must only be made by designated Plant Records staff trained in the correct use of the Database and the labeling printers. As much as possible, mature plants ready for planting should be given permanent tags while still in the nursery. When the Plant Records form is submitted for a proposed plant out, the Plant Records staff will make sure all the plants have permanent tags.

One exception would be common native plants which may be going into restoration projects, where a permanent tag would not be appropriate. Another exception is when a group of groundcover plants are planted together.

Federally listed threatened or endangered (T & E) plants, PEPP or other rare plants **MUST** be given individual permanent tags with plant numbers (001,002, etc.) as soon as they are placed on plant out tables or reach an appropriate size in the nursery.

Permanent labels will be affixed on, or adjacent to, permanent plantings in the best manner appropriate to the type of plant material. This may be on a stake, or on a coiled wire around the trunk or large limb of a tree. If a number of individual plants of the same accession (which are not T & E or PEPP) are planted as a contiguous group, they may be labeled as a group with only one or two permanent labels, as needed to identify them. This may be the case with ground covers and in the restoration projects. However, T & E plants must be labeled individually in all situations, in order to maintain the genetic identity of plants derived from different individuals within or between wild populations of the same species.

H. Outplanting

Plants may not be taken from the nursery without:

- 1. Required permanent metal tags**
- 2. Completed plant out record form**

The designated manager of each collection or garden area will coordinate with the Director of Living Collections and Horticulture or his designee, Plant Records, gardeners and other knowledgeable staff to prepare a plan for locating plants within the collections as best suited to the purposes of that collection and the needs of the plants.

Each designated manager will be given map printouts of their area. When conducting a new outplant that person will mark the outplant locations on the map. This map page should be submitted to Plant Records with its accompanying Plant Out Record Form (Appendix G). (Map print copies can also be made from the map binders available in each Garden office.)

The Plant Records staff will enter into the database the location, accession numbers and plant numbers as submitted on the Plant Records Form for each outplanting, and will coordinate with the GIS Manager to map new plantings.

This record keeping system should facilitate access to the original collection data and present location of all individuals of a given species, or a given accession, from the database, as needed for research or conservation purposes.

I. Maintenance of Individual Collections

1. Procedures Manual

The DLCH in conjunction with the Director of each garden will be responsible for the design and update of a Garden Procedures Manual. Each gardener will be provided with a copy of the Manual.

The Manual will outline procedures to be followed in the horticultural maintenance of each garden area and collections within it. Expectations for maintenance tasks should be clearly stated in a user-friendly format. It should also contain:

- maps of the areas for which (s)he is responsible

- list of plants in the area with Accession numbers
- minimum standards for the care of all collections
- priority care as required for special collections
- safety procedures for equipment operation, maintenance, vehicle safety and chemical use
- disaster preparedness, and emergency procedures and contacts
- invasive weed identification
- other horticultural training information such as pruning technique, etc.
- forms to record and monitor plant health, pest problems, fertilization

2. Monitoring

Ongoing monitoring of each collection will be conducted on a regular basis by the following:

- Designated manager of that collection or garden location and his/her supervisor
- Plant records & GIS for review of tagging, ongoing mapping updates
- Integrated Pest Manager - Plant health assessment
- Plants should be evaluated by DLCH or his designee on an ongoing basis for their potential to become invasive. NTBG is a signatory of the Draft Voluntary Code of Conduct for Botanical Gardens (Appendix E) as part of its environmental conservation practices.
- Spontaneous seedlings should routinely be removed by gardeners (e.g., palms) except in restoration projects where their occurrence may be an indicator of success

3. Evaluation of Collections

As stated in the Evaluation section, the DLCH and Garden Director will evaluate each collection or area at regular intervals, based on a report by the Curator of the collection, or their designated staff person, and an onsite visit. These officials must ensure the completion of all evaluations for their areas of responsibility at least once every five years. A sample Evaluation Score Sheet is found at Appendix N.

The appropriate Director will utilize the information obtained from the evaluations to make necessary procedural and programmatic adjustment, and to make recommendations as needed for revisions of this policy.

J. Distribution of Plant Material Outside NTBG

1. Plant Distributions for Scientific Use

Requests from other institutions, including botanical gardens, arboreta, universities and individual researchers must follow the procedure of completing a Distribution Form (Appendix I) or for breadfruit, the Breadfruit Institute's Material Transfer Agreement (Appendix K). This includes plants that will be used for research. The

request should specify the exact plant materials, amounts of material needed, and the purpose for which they will be used. Plant materials are not to be distributed for any commercial purpose, except with prior approval of the DLCH or Assistant DLCH, and, in the case of breadfruit, the Director of the Breadfruit Institute. Restricted special collections are not to be distributed without approval of original donor. This information will be recorded in the Living Collections Database under each accession distributed. Terms and conditions of the transfer of plant material should also be recorded in the Database.

2. Plant Outreach Management (POM) Program

Donations of any plants or sales of non-endangered plants may be made as nursery inventory and garden needs allow. When plants are going to a community organization, school, community restoration project, or other organization, a list of the plants must be submitted to Plant Records on the NTBG POM Plant Records Form (Appendix L) prior to leaving the nursery. Necessary information on the form is:

- Name, date, activity and new location of plants
- Plant accession number and plant number
- Genus, species, number of plants
- Permit number under which plants were collected
- Organization or institution receiving plants
- Contact person, address, phone number or e-mail address

This POMP information is then entered, by the Plant Records staff, in the database under each accession number. A POM form is also needed for items 3 and 4 below.

3. Community Outreach or Donations for Educational Purposes

NTBG staff attends various local community events to promote the garden. It may be appropriate to give or sell plants at these events, which are of particular interest to members of the community, to encourage public support of horticulture and conservation. These plants should have labels which give proper care instructions. NTBG accession information should be removed. While NTBG will not ordinarily have plants of endangered species available for this purpose, in cases where excess plants of second generation (horticultural, not wild) origin are available, they may be used, if accompanied by the orange tags required by the State Department of Forestry and Wildlife.

4. Plant Distributions for Restoration Collaborations Outside NTBG Property

The NTBG Conservation Department may make plant material available for native plant restoration projects in compliance with State and Federal law. These plants may be made available as part of a contract for services in which NTBG's LC&H or

Conservation Department is a consultant collaborator. Reasonable costs may be assessed to recover the costs of propagation, curation materials, and labor.

K. Deaccessioning

Deaccessioning is the process of amending the records of plants removed from the garden, and not the actual removal process. Since the deaccessioning of a plant may involve some controversy, it requires the approval of the DLCH, Assistant DLCH, or the Garden Director. Generally, a plant is deaccessioned only if it is

- dead,
- no longer relevant to the purposes of the NTBG,
- missing,
- undesirably toxic or otherwise dangerous,
- a potential weed in the State of Hawaii (or Florida, in the case of The Kampong),
- or is being replaced by a more desirable accession.

Deaccession is appropriate only when all plants of a given accession are removed. When other plants of the same accession remain in the garden, the removal of a single plant is recorded in the plant out record as dead, with an appropriate annotation as to reason.

All potential deaccessions other than dead collections are to be reviewed by the DLCH, Assistant DLCH, or Garden Director before deaccessioning. Live, accessioned plants will be deaccessioned from the NTBG collection only with Director approval. Dead or diseased plants may be deaccessioned at the discretion of the designated staff person. When inadequate provenance information is available for a particular taxon, deaccessioning is recommended, if carefully accessioned, wild collected plant material is obtained to replace it. The Curator of Plant Records and the Geographic Information Systems Specialist will be notified of any plant removal or disappearance on a Deaccession Request Form (Appendix M) so the accession database and maps can be updated.