Department of Environment and Natural Resources
Ecosystems Research and Development Bureau

29 October 2021

MEMORANDUM FOR THE SECRETARY

THRU : The Undersecretary
Policy, Planning and Project Management

FROM : The Director

SUBJECT : **ERDB MEMORANDUM CIRCULAR ADOPTING THE MANUAL FOR THE BOTANY LABORATORY OPERATIONS OF THE ECOSYSTEMS RESEARCH AND DEVELOPMENT BUREAU (ERDB)**

The undersigned is respectfully furnishing the Office of the Secretary a copy of the ERDB Memoramdum Circular No. 2021-09 adopting the Manual for the "Botany cum Herbarium Laboratory Operations".

The said manual contains valuable information about the laboratory and its facilities, herbarium usage and access, depositing and loaning a specimen for the clients, routinary laboratory works that the laboratory personnel handles, collecting and preserving specimens, and safe handling of specimen and equipment.

The Laboratory and Experimental Services Division (LESD) of ERDB shall periodically review this manual for updating and for other information on plant herbarium specimen based on the general accepted standards for laboratories.

FOR SECRETARY'S INFORMATION, PLEASE.

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Department of Environment and Natural Resources
Ecosystems Research and Development Bureau

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ERDB MEMORANDUM CIRCULAR
No. 2021 - 09

SUBJECT : ADOPTION OF THE MANUAL FOR THE BOTANY CUM HERBARIUM LABORATORY OPERATIONS OF THE ECOSYSTEMS RESEARCH AND DEVELOPMENT BUREAU (ERDB)

In the interest of the service and in line with the ERDB's effort for its Botany cum Herbarium Laboratory of the Laboratory and Experimental Services Division (LESD) to serve as a depository facility of plant specimens in support to the different Research, Development and Extension Programs, Projects, and Activities (RDE PPAs) collected by ERDB researchers, the attached Manual for the operation of the said laboratory is hereby adopted for the information and guidance of all concerned.

The manual contains valuable information about the laboratory and its facilities, herbarium usage and access, depositing and loaning a specimen for the clients, routinary laboratory works that the laboratory personnel handles, collecting and preserving specimens, and safe handling of specimen and equipment.

The Laboratory and Experimental Services Division (LESD) of ERDB shall periodically review this manual for updating and for other information on plant herbarium specimen based on the general accepted standards for laboratories.

This Memorandum Circular takes effect immediately.

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Department of Environment and Natural Resources
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BOTANY *CUM* HERBARIUM LABORATORY OPERATIONS MANUAL

Laboratory Service Section
Laboratory and Experimental Services Division

2021

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INTRODUCTION

The Ecosystems Research and Development Bureau (ERDB) is the principal research arm of the Department of Environment and Natural Resources (DENR). Its research, development and extension activities are focused on the five major ecosystems of the Philippines which include: 1) forests, 2) upland farms, 3) grassland and degraded areas, 4) coastal zone and freshwater, and 5) urban areas.

The Laboratory and Experimental Services Division (LESD) is one of the service divisions responsible in the coordination and monitoring of the provisions of laboratory services being performed by the Research, Development and Extension Centers (RDECs), and the collaboration with other national and international institutions regarding researches on the Environment and Natural Resources (ENR). LESD also serves as the repository of the wildlife flora and fauna specimens, quality seeds, and other needed services in support to Research and Development (R&D) Programs, Projects and Activities of the ERDB Main Office (ERDB MO) and RDECs (http://erdb.denr.gov.ph).

The ERDB Botany Laboratory 'cum' Herbarium is one of the ten (10) laboratories under the Laboratory Service Section of LESD. It was established to serve as a depository facility of plant specimens collected during the implementation of R&D projects like vegetation analysis by ERDB researchers. Also, the laboratory received duplicates of plants specimens submitted and referred to by researchers from academe and other research institutions which eventually became a property of the laboratory as they bear permanent herbarium number and is recorded in the laboratory's accession book.

The herbarium also contains valuable data on plant habit, phenology and associations of a particular collection site and the collector.

The Laboratory and Experimental Services Division-Laboratory Service Section (LESD-LSS) of ERDB shall periodically review this manual for updating and smooth implementation of its different activities in the bureau.

HERBARIUM ACCESS

The ERDB Botany Laboratory 'cum' Herbarium is open to all visitors during weekdays from 8:00am to 5:00pm except for holidays. The requesting party shall either write a letter to the Director stating its purpose and the time of visit or walk-in clients can also be accommodated. However, due to the threat of the Covid-19 pandemic, prior notice shall be practiced to give enough time for the laboratory in-charge to prepare. All visitors (with approved request letter) utilizing the collection are requested to sign into the visitor's logbook.

DEPOSITING A SPECIMEN

When depositing a specimen, the following guidelines must be observed:

1. The necessary data/information obtained should be properly documented/labeled such as the collection site information, phenological data and other distinct features of the specimen before turning it over to the laboratory.

2. Specimens must be sterile. It should contain an inflorescence or fruit to be considered as type specimen.

3. If possible, the specimen should have duplicates for possible exchange to other herbaria in the future.

FACILITIES

In 2015, old herbarium cabinets were upgraded into a file compactor/mobile shelving system. It is a modern type of storage system that helps in storing large amounts of herbarium specimen collection and saves space in an area.

The deep freezing of specimens as maintenance protocol is done to protect against stored insect pests like silver fish and tiny cockroaches. The specimens are usually deep frozen for about 48 hours or longer, depending on the kind of samples being treated using an upright freezer.

Collection of herbarium specimen will be placed in an oven after preservation (dry or wet method). Oven drying will take place for three (3) days or longer depending on the type of plant specimen (eg. succulent) at a temperature of 80°C.

SERVICES OFFERED BY THE LABORATORY

- ✓ Accession and storage of plant herbarium in the EBL (ERDB Botany Laboratory).
- ✓ Identification of plant specimens
- ✓ Botanical library
- ✓ Accommodates students who are recommended by school to undergo internship/OJT prior to graduation to be adequately familiar with the actual laboratory operations and management.

REQUEST FOR SPECIMEN LOAN

Specimen can be requested on loan by sending a written formal request addressed to the ERDB Director and should be duly approved.

Herbarium specimen can be loaned for a period of 2 weeks for local use and 3 months for foreign institutions which shall be duly agreed by both parties. Expenses for mailing of specimen shall be borne by the requesting party.

ROUTINARY LABORATORY WORK

COLLECTING AND PRESERVING SPECIMENS

Materials needed:

1. Pruning shear or bolo
2. Large plastic bags/ Ziplock 8"x13"
3. Field labels and collection number tags
4. Wooden presser (pair)
5. Old newspaper
6. Tying material
7. Field notebook
8. GPS (Global Positioning System)
9. Denatured Alcohol

Procedures:

Select small branches or twigs with leaves and other plant features/characteristics required for positive identification such as fruits and flowers.

Select parts of the plants which are not infected or destroyed. The desired size of specimens is 25-30 cms. Write down the necessary information about the specimen (common or local name, collector's name, date, place of collection, collection number, ecological data, and plant notes/remarks) on the field notebook.

Preserving herbarium specimen using wet method

Place collected plant parts between folds of newspaper and put it inside a ziplock/plastic bag and gradually and generously pour denatured alcohol and store for 1-2 weeks in a cool dry area.

Preserving herbarium specimen using dry method

Dip collected herbarium plant specimen with denatured alcohol and place between folds of newspaper and automatically put it into the plant presser.

Oven dry for three to four (3-4) days or longer depending on the type of plant specimen (eg. succulent) at a temperature between 80 - 100°C.

PROCESSING OF INCOMING COLLECTIONS

In the processing of plant specimen, the laboratory staff has refrained from using harmful chemicals like phenol as this was found to be highly toxic and hazardous to human health. As an alternative, the collected specimens are treated with denatured alcohol and deep frozen for about 48 hours or longer, depending on the kind of samples for maintenance.

The activities included in the processing of plant specimens are:

- For tree species

  - treatment/curation
  - oven-drying
  - labeling/mounting
  - deep freezing
  - recording in the accession book
  - placing inside specimen cabinets

- For Rattan and Bamboo species

  - Place rattan and bamboo collections in folders and boxes
  - treatment /curation
  - oven-drying

MOUNTING AND STORING SPECIMENS

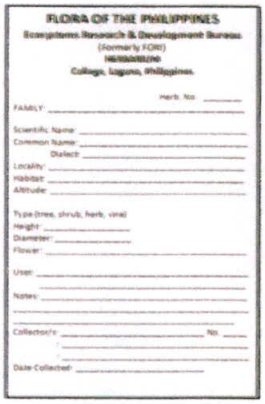
Materials needed:

a. Glue or tape
b. Pencil
c. Morocco paper (folder type)
d. Bristol board (std. herbarium sheets 16 ½" x 11 ½" or 42 cm x 29 cm)
e. Field label
f. Pentel pen
g. Small soft brush

Procedures

Place the oven dried herbarium specimen on a standard herbarium mounting paper or Bristol board with a size of 16 ½" x 11 ½" (42 cm x 29 cm). Arrange them in such a way that the main features used to identify the plant are evident. Glue or tape the dried specimen.

Attach the field label (scientific name and family, collector's name and collection number, date of collection and herbarium number) on the upper left corner of the sheet. Specimens should be properly identified. Below is the herbarium label used by ERDB Botany Laboratory cum Herbarium.


FLORA OF THE PHILIPPINES

Ecosystems Research & Development Bureau

(formerly FORI)

HERBARIUM

College, Laguna, Philippines

Herb. No. _____

FAMILY: _____

Scientific Name: _____

Common Name: _____

Dialect: _____

Locality: _____

Habitat: _____

Altitude: _____

Type (tree, shrub, herb, vine)

Height: _____

Diameter: _____

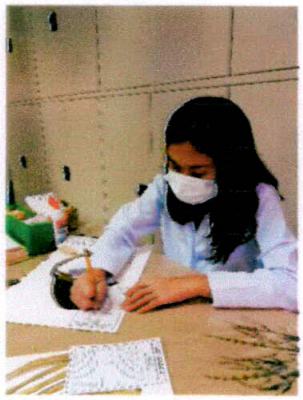
Flower: _____

Uses: _____

Notes: _____

Collector/s: _____ No. _____

Date Collected: _____



Place identified and mounted specimen in morocco folder.

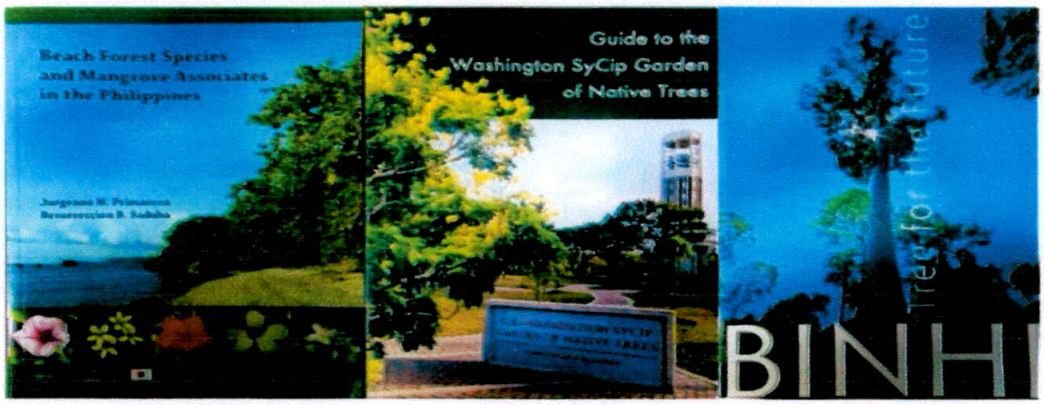
Store the specimen in the mobile shelving cabinet after having it stamped and recorded in the accession book and database.

Clean specimens every three (3) months using a clean soft brush and have it deep freeze for 48 hours in an upright freezer.

Have duplicates of the specimens for each species collected for possible exchange to other herbaria.

IDENTIFICATION

One of the methods of identification is with the use of herbarium specimen. But before it can be used as a reference, it should have first the proper identification using the keys (dichotomous and interactive) and using literatures and / or plant guides. Below are some examples of book references that are helpful in identifying collected herbarium specimen.



SAFE HANDLING OF SPECIMEN AND EQUIPMENT

Herbarium specimen collections

- Ensure that plants are thoroughly dry and free of pests and diseases before placing inside the mobile shelving cabinets.
- Never use a microwave oven to dry or treat herbarium specimens for pests.
- If there are signs of infestation, place specimens in a freezer and wrap them in plastic for 7-10 days to eliminate pests (e.g., insects, insect eggs, fungal spores).
- Reduce pest infestations with regular cleaning of floors, cabinets and workspaces.
- Inspect herbarium specimens in the mobile shelving cabinet regularly.
- Keep work area neat and free of any unnecessary objects.
- Thoroughly clean your laboratory workspace at the end of the laboratory session.
- Keep mounted specimens in folders specimen-side up, never turning the specimen sheets in a folder like the pages of a book.
- Remove each specimen from the folder "specimen-side up," arrange them in a pile or individually if space permits.
- Replace specimen sheets in the same order as they were removed from the folder or shelf.
- Always use two clean hands to hold the specimen.
- Limit stacked folders so that the weight of the top specimens does not damage the lower specimens.
- The laboratory in-charge will return the specimens in mobile shelving cabinets to ensure correct placement.

Mobile shelving cabinets

- Before opening a new aisle of the mobile shelving system, make sure that there is no one in the passageway.
- Always move one shelve of the mobile shelving system at a time by turning the hand wheel either on right or left side.
- Always operate the mobile shelving unit with care and avoid collision of the units with each other as it can damage the unit and herbarium specimens can

be dislodged. All the tracks should be cleared from any obstructions on the floor.

Oven

- Preventive maintenance and calibration of equipment such as the oven for the oven-drying of plant herbarium specimen should be conducted annually to guarantee accuracy.

SAFE HANDLING OF CHEMICALS

- Flammable liquids such as the denatured alcohol should be stored in containers and tanks properly labeled with the name and properties of its content.
- Flammables should not be stored near exit areas.
- Properly label the container with masking tape or sticker paper to identify the chemical stored inside.
- Denatured alcohol poses serious health threat that includes nausea, drowsiness/dizziness from ingestion or inhaling its fumes, skin dehydration and eye irritation. It is therefore advised to always handle wearing safety gear and with the right apparatus to avoid accident

REFERENCES

ERDB-DENR. 2019. Laboratory Safety and Waste Management Manual. pp.30-32.

The official website of Ecosystems Research and Development Bureau. Accessed at http://erdb.denr.gov.ph on Oct. 25, 2021.

Tolentino, Haira Jill A. Protocol in Making Herbarium Specimen. Unpublished. June 2020.