Department of Environment and Natural Resources
Ecosystems Research and Development Bureau

DEC 2 8 2021

ERDB MEMORANDUM CIRCULAR
No. 2021 - 12

SUBJECT : ADOPTION OF THE GUIDELINES IN THE MANUAL ON THE FOREST TREE SEED CENTER (FTSC) OPERATIONS OF THE ECOSYSTEMS RESEARCH AND DEVELOPMENT BUREAU (ERDB)

In the interest of the service and in line with the ERDB's effort to provide quality and reliable laboratory test results in support to the different Research, Development and Extension Programs, Projects, and Activities (RDE PPAs), the guidelines stipulated in the Manual on the Forest Tree Seed Center (FTSC) Operations are hereby adopted for the information and guidance of all concerned.

The Manual on the FTSC Operations will serve as a guide on how the FTSCs should effectively operate and perform their functions. It will contain all the activities being conducted in the FTSC such as Seed Collection, Seed Processing, Seed Testing and Seed Storage. The Manual also contains the process of Seed Certification.

The Forest Ecosystems Research Division (FERD) of ERDB shall periodically review this manual for updating and for the introduction of new seed testing protocols as well as the safety and maintenance measures based on the general accepted standards for laboratories.

This Memorandum Circular takes effect immediately.

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Forest Tree Seed Center
Operations Manual

FOREST TREE SEED CENTER (FTSC) OPERATIONS MANUAL

2021

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PREFACE

One of the factors that affect the success of any plantation establishment or tree planting activities is the use of good quality seeds. This highlights the importance of proper seed handling, from seed collection to seed storage. The Ecosystems Research and Development Bureau (ERDB) of the Department of Environment and Natural Resources (DENR) established the Forest Tree Seed Centers (FTSCs) to serve as the testing center and storage facility for seeds from seed sources all over the country. Seed testing, germination, and seed health tests are conducted in FTSCs to ensure the quality of seeds from identified phenotypically superior mother trees. This aims to support the National Greening Program- Production of Quality Planting Materials (NGP-PQPM) and other forest rehabilitation efforts of the government.

This operations manual will serve as a guide on how the FTSCs should be operated to provide functions such as Seed Collection, Seed Processing, Seed Testing, Seed Storage, Seed Sources and Seed Suppliers Accreditation, and Seed Certification.

Further, through this manual, DENR-ERDB hopes to provide the necessary information, practices, processes and techniques in attaining the best quality of seeds for the greening programs of the government as well as those of the private and non-government institutions.

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Director, ERDB

ACKNOWLEDGEMENT

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To God Almighty!

Forest Tree Seed Center

A Forest Tree Seed Center (FTSC) is a designated place where collected seeds from documented seed sources shall be brought, received, recorded, processed (i.e., dried, cleaned, and stored), tested, sorted, registered, and distributed to the nurseries and for the eventual outplanting for the purpose of forestation and breeding. To continuously support the government's need for quality planting materials, the FTSC ensures that the quality of the seeds to be collected from Seed Production Areas (SPA) and Individual Plus Trees (IPTs) have undergone science-based tests and assessments (as per DENR Administrative Order (DAO) 2021-21. *Adopting the Field Manual for Tree Seed Collection, Processing and Certification of Quality Planting Materials and Providing Mechanisms on its Adoption*).

The FTSCs were established to primarily support the implementation of the National Greening Program (NGP). With the implementation of NGP, ensuring the source of quality planting materials remains a priority for a higher success of plantation establishment. Hence, DENR-ERDB was able to establish and maintain six (6) FTSC nationwide through the NGP-PQPM. The FTSC serves as the storage facility and testing center for seeds from the seed sources all over the country. The FTSCs conduct germination and seed health tests to ensure the quality of seeds from its sources to test the quality of seeds from the Seed Source Areas.

Figure 1. Locations of the six Forest Tree Seed Centers (FTSC) established by the Ecosystems Research and Development Bureau (ERDB)

Each facility promotes the use of seeds that are properly documented or products of technology such as Seedling Seed Orchard (SSO) or Clonal Seed Orchard (CSO). The Seed Processing Areas, Seed Storage Chambers, and Seed Laboratory can be found in all the FTSCs to ensure that all the seeds to be stored are in good quality

Figure 2. The six FTSCs in the Philippines established by ERDB

Staff and Training

Staff Requirement

Having realized the importance of the quality of planting materials to be produced for the success of the greening efforts of the government and non-government institutions, the FTSC must have adequate staff or personnel that are trained and equipped in the operations of the facility, as follows:

1. FTSC Manager

The FTSC Manager serves as the overall supervisor of all operations of the FTSC including financial requirements, determining source requirements, setting of seed collection schedules, and determination of additional requirements for the development of new policies that may occur. The FTSC Manager also reviews and assesses the documents for the application for Certification of Seed, and Forest Tree Seed Sources, as well the application for accreditation of Forest Seed Suppliers in case of private individuals/entities. The FTSC Manager then endorses the said applications for certification and accreditation to the Field Forest Tree Seed Committee (FFTSC), chaired by the concerned ERDB Center Head, for approval. If the application does not pass the screening process, the FTSC Manager can already disapprove the application (Sections 6, 8, and 9 of the Field Manual attached to DAO 2021-21).

2. Field Manager/Station Head

The Field Manager manages/supervises the seed collections from identified seed sources (e.g., Seedling Seed Orchards/Clonal Seed Orchards, Seed Production Areas, Seed Stands, and Seed Trees) and the management and development of new seed sources. The Field Manager comes from the ERDB Main Office and its Research, Development and Extension Centers (RDECs). S/he complies with the trainings on Occupational Health and Safety in operation and Tree climbing.

3. Collection Team Leader

The Collection Team Leader plans the seed collection activities, selects trees for markings, and complies with the necessary documentation in seed collection.

Laboratory Manager

The Laboratory Manager supervises the documentation in relation to seed handling, certification, laboratory activities related to seed testing, as well as seed disposition and distribution. The Laboratory Manager is also responsible for the issuance of seedlot numbers to each seedlot collection.

4. Seed Technologist/Tester

The Seed Technologist/Tester is responsible for routine testing of all seedlots entered into the system. Sh/e also undertakes the testing of seed as part of research activities and updates/improves methods and standards for laboratory and field use.

5. Seed Documentation Staff

The Seed Documentation Staff ensures that all records and activities in relation to seed is maintained. S/he has access on the data/information and is responsible for seed packaging and dispatch.

6. Support staff

The Support staff provides technical, logistic, financial, and administrative support to the FTSC Manager. Support staff includes laboratory assistants, laboratory aides, tree climber, seed collectors, clerical personnel, and drivers.

Training Requirements

The staff should be equipped with practical and scientific knowledge on the various activities of the FTSC.
The trained staff should also train others on the following areas:

- Seed sources identification;
- Seed collection;
- Seed cleaning and sorting;
- Seed sampling;
- Seed testing and storage;
- Documentation;
- Use of database;
- Seed dispatch/certification; and
- Tree climbing, occupational health and safety.

Courtesy Protocols on Seed Collection (based from Australian Tree Seed Center (ATSC), 2001

- Necessary permits and authorizations shall be accomplished prior to seed collection.
- Courtesy calls to the concerned authority or personnel shall be done before and after the seed collection.
- The DENR Regional Office, Office of the Provincial Environment and Natural Resources (PENR), and Community Environment and Natural Resources (CENR) shall be properly informed before the start of the activity. The specific details such as contact name, location, maturity indices of seeds for collection, and access to the collection site shall likewise be discussed.
- For seed collection in private lands, the owners should be properly informed before the conduct of the activity.
- All collections should be made sympathetic to maintain the conservation of the species and integrity of the tree population.
- Avoid removal of not more than one quarter of the crown of the tree.
- Trees as sources of seed for collection should have a minimum distance of 50 meters apart.
- All tree branches must be removed from the road. Avoid leaving branches hanging on the tree which may cause hazard. Large branches must be cut into sections.

Seed Tree Assessment

Seed Sources

One of the factors to consider for a successful plantation establishment is the quality of the seeds used. It is essential to choose the correct seed sources for establishing plantations. Ideally, seed collection should be from a population of interbreeding trees; growing in a uniform fair site; and sufficiently large enough to permit collection of large quantities and the location of the seed source shall be identified and properly documented.

With regards to the seed's genetic history, the following aspects must be considered:

- In natural stands, neighboring trees tend to be related, because of the way seed and pollen are normally distributed.
- There is a tendency to collect from one or few trees.

Refer to the **Annex 2.** ***Seed Tree Assessment Form for the establishment procedure in the selection of candidate plus trees***.

Pointers on Seed Maturity

Newly collected fruits and seeds are particularly susceptible to decay due to relatively high moisture content. The ability to determine what collectible fruit or seed looks like on the tree and its stage of maturity are essential.

a. Leguminous species- seed pods and seed should be dark in color (brown or black). Sometimes there is an after ripening effect on seeds of some species where collection can be done earlier (light brown in color) (DENR-ERDB, 2010).

b. Eucalypts – the seed is mature when the capsules have well-formed and prevalent incision in the valves and contain brown seeds. The seed can be inspected by cutting open the capsule with pruning shears (DENR-ERDB, 2010).

c. Tropical forest tree seeds- familiarization with fruit color during development is an important factor in determining seed maturity. Softness, moisture content and seed shedding/ dropping are also important indicator (DENR-ERDB, 2010).

Phenology

Phenology is the study of the growth and development especially the flowering and fruiting of plants in relation to the climatic and site factors. The flowering of forest trees varies from species to species thus, observation of the phenological data is essential. Phenological data also indicates changes in the pattern of growth and development of trees that can be attributed to some environmental factors. Phenological data of various forest tree species are cited in **Appendix 1.** ***Phenological Data of Forest Plantation Species***.

During fieldwork and in the conduct of seed collections, the collection team should be very observant in conducting phenological observation hence, it is very important to fill out **Annex 3.** ***Phenology Calendar Form***.

Field reconnaissance and timing of Seed collection

Seed sources should be visited prior to seed collection activity to ensure availability of seeds.

Seed Collection

Planning

The Seed Collection Team Leader supervises and undertakes seed collection activities particularly on planning and technical documentation.

Basic Considerations

- Determine the purpose of collection (e.g., plantation establishment, industrial tree plantation reforestation, urban, tree improvement, and related activities)
- Identify target species
- Identify quantity of seed required
- Gather data on past collection records, herbarium, references, and related data
- Determine seed maturity and timing of collections
- Identify funds for seed collection
- Coordinate needed equipment, vehicle and manpower
- Secure permits and coordination with concerned offices
- Ensure proper training on seed collection and safety for personnel involved
- Conduct first aid training prior to the seed collection activity

Selection of provenances

- Determine the provenances at the planning stage in conjunction with the objectives of the collection.
- Select the number of trees to be sampled depending on the objectives of the collector. Standard practice is 10-15 trees per provenance. In some cases, up to 100 or more trees may be required to form a base population for intensive breeding programs.
- Within provenances, sample unrelated trees to cover the genetic

variability of the population. One hundred meters is the rule of the thumb.

Gather all basic information on the identified seed source area for proper identification and record. Fill out **Annex 1: *Detailed Information on Identified Seed Source***

Methods

Various collection methods depend on the size of the tree, species and the conditions within the site of the collection.

1. Collection of fallen fruits from the forest floor from natural seedfall

This is commonly done for large-fruited genera (*Tectona, Gmelina, Dipterocarps*). It is simple and cheap but has several disadvantages. The seed obtained may have poor physical and physiological quality and there is uncertainty in identifying the mother trees of the seeds collected.

To obtain best results, collect seeds from the ground during optimum seedfall. Please refer to **Appendix 2: *List of SPAs/IPTs***.

2. Collection from Standing Trees

a. **Collection from the crown**. This is a widely used method of collection by simply climbing into the crown of the tree by using pole implements.

b. **Climbing spurs**. The standard climbing spur comprises a shank, with lower and up- per straps and pads for attaching to the leg and support the foot through a stirrup to which is fixed to a gaff or spike. The climber is supported by a belt that passes round the bole of the tree and is attached to both sides of the climber's waist. A minimum of two belts are used to maintain a safety line round the tree while transferring to other branches. Descending the tree using spurs is tedious and slow, so descent is normally accomplished using abseiling techniques.

c. **Use of caving rope**. Attach a caving rope (11mm diameter by 60m long) to the climber. When descending, the rope is placed over a secure branch and the climber descends using appropriate descending gear used by cavers.

d. **Other Methods**

- Climbing ropes-single rope technique
- Collection by hand where trees are small, and the fruits/seeds are low enough to reach from the ground
- Use of pole implement with saws, shears or hooks may reach a height of 8-10m.

3. Use of Collection sheets

For most collection, collection sheets made from calico cotton (*katsa*), or a cotton synthetic fiber are used. The fabric must allow free air movement to avoid the fruit or seed from being moldy particularly if the fruit/seed or environment is moist. Plastic containers are not advised unless the fruit/seed is only stored for a short period or in case of fleshy fruit where the seed does not loose moisture.

4. Labeling

Practice strict documentation for maintaining the identity and purity of each collection. There must be a system to prevent a seedlot from being contaminated with other seedlot throughout the process starting from seed collection. Careful labeling through each process is essential. Field labels, which retain field identification, should be water resistant. Clearly write the number assigned to each tree or provenance collection by the collector on the labels which are then placed inside and outside the container. Use the same number to identify the voucher specimen with written information associated with the collection with the field data sheet.

All information should be consistent with **Annex 1.** ***Detailed Information on Identified Seed Sources.***

Maintaining the identity of collected fruits and seeds

- Observe caution during loading and unloading of fruits and seeds several times during seed handling since these are prone to mix up and lose of labels and identity.
- Clearly label each container of seeds indicating the field number, species, location, and date of collection. Always use two labels, one fixed to the outside of the container and one inside the container together with the seed. Use waterproof labels and ink.
- If bags are emptied for drying or processing, keep the bags or containers together with the seeds and put them back together with the seeds after every event of handling.
- As the bulk is reduced, some containers may become redundant. Remove surplus labels and reflect the numbers of corrected labels.
- When one collection or seedlot is divided into a number of bags/containers, state in each label the number of containers involved (example: 1/3, 2/3, 3/3).

Bagging and Transportation

- Fruits are removed from branches either by hand or with the use of shears on to collection bags. Remove the branchlets and leaves from the collection leaving only the fruits for bagging and storage. Label each container with the corresponding collector's field number.
- Extract the seeds from the fruits during the course of the field trip activities depending on the factors including species, condition of the fruit, capacity of the vehicle, climatic conditions, and drying time available to clean the seeds in the field. Otherwise, transport the fruits to the FTSC.
  - Eucalypts and Casuarina fruits open readily when dried or when climatic conditions are conducive to drying the seed and can be extracted within a few days.
  - For Acacias, seeds readily shed once the pods are dry and cleaning can sometimes be undertaken in the field.

Botanical Specimens

The decision to collect botanical or herbarium specimens is left to the collector's discretion. Apart from use in taxonomic studies, specimens must be collected when there is doubt in the identity of trees from which the seed was collected.

The collected specimens should be deposited in a Botany cum Herbarium Laboratory. In depositing a specimen, the guidelines must be observed as stipulated in ERDB Memorandum Circular No. 2021-09 dated November 08, 2021.

Seed Processing and Testing

After passing the requirements stipulated in the DENR Administrative Order (DAO) No. 2021-21 dated June 30, 2021, also known as *"Adopting the Field Manual for Tree Seed Collection, Processing and Certification of Quality Planting Materials and Providing Mechanisms on its Adoption"*, the seeds collected are ready for transport to the FTSC for Seed Processing and Testing. Germination tests, moisture content, purity, seed weight, and seed health shall be done by observing the guidelines as stipulated in ERDB Memorandum Circular No. 2021-10 dated November 16, 2021.

Seed testing results provide important information to both the seed bank and the client. The FTSC Manager ensures that only quality seeds are to be dispatched and distributed to the clients.

Sampling

Conduct seed testing using representative samples of the whole seedlot. Obtain seed samples by taking small portions at random from different parts of the seedlot and then combining them. Submitted samples are drawn from the bulk seedlot.

For manual or mechanical mixing of seedlot or taking a sample, ix well all samples in a seedlot and spread out evenly either in a flat container, tray or mixing basin. Next, get a small portion of the sample from different places in the tray until the proper quantity has been reached as working sample (refer to MC 2021-10 for seed quantity requirement).

A seedlot can be mixed by hand or either with the help of a shovel for large seedlots spread on the floor but not damaging the seeds. The important point is that the whole seedlot is thoroughly mixed. Random sub-samples can be taken to be used in the test as working sample.

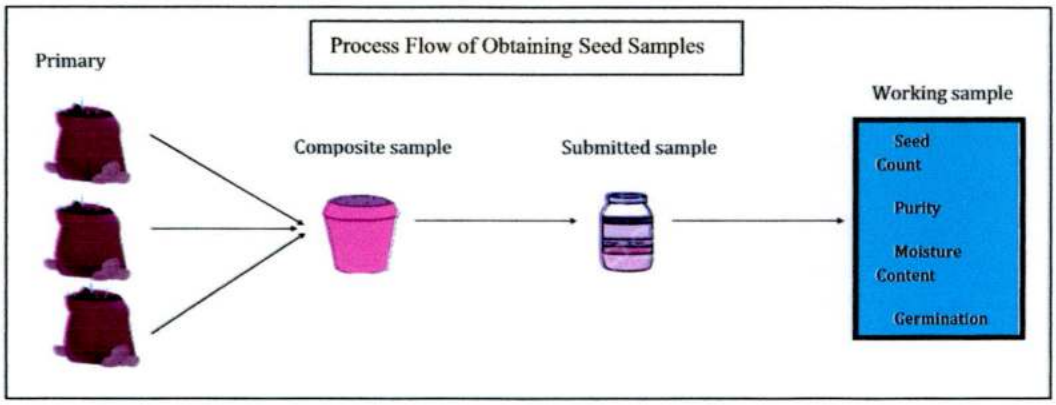

Figure 3. Flow of Obtaining Seed Samples

- **Primary sample.** It is obtained from the seedlot by taking portions at random from different positions of the lot. The objective of sampling is to obtain a representative sample size suitable for test. It is expected that the results reflect the average quality of the seedlot.
- **Composite sample**. It is a mixture of all primary samples taken from the seedlot.
- **Submitted sample.** It is the samples submitted to the seed testing laboratory which is a reduced representative of the composite sample.
- **Working sample.** It is a reduced quantity of sample from the submitted sample in the laboratory for use in a given quality test (e.g., germination test, moisture content, purity, seed count, seed health).

***Note**: Once all seeds have been processed and handled properly, seedlot numbers are assigned accordingly.*

Registration of the Seeds Collected from the DENR SPAs/IPTs/CSOs/SSOs

Seeds collected from the DENR established Seed Production Areas (SPAs)/Individual Plus Trees (IPTs)/Clonal Seed Orchard (CSOs) and Seedling Seed Orchard (SSOs), once cleaned, must be brought to the FTSC Laboratory. The seed is weighed and issued a seedlot number before testing and storage. The seed is entered into the seedbank as individual tree lot or a bulk or both.

Seedlot – defined as a specific quantity of seed of the same species, provenance, date of collection and handling history and which have been identified by a single number in the seed documentation system.

Please refer to the assigned Seedlot Numbers per RDEC below:

OFFICE	REGIONS	PREFIX CODE AND SEEDLOT NUMBER
ERDB Main Office		**A00001 n**
WWRRDEC	**CAR**	**B00001 n**
WWRDEC	**R1**	**C00001 n**
WWRRDEC	**R2**	**D00001 n**
WWRRDEC	**R3**	**E00001 n**
UBRDEC	**R4a**	**F00001 n**
UBRDEC	**R4b**	**G00001 n**
UBRDEC	**R5**	**H00001 n**
CRERDEC	**R6**	**I00001 n**
CRERDEC	**R7**	**J00001 n**
CRERDEC	**R8**	**K00001 n**
FWRDEC	**R9**	**L00001 n**
FWRDEC	**R10**	**M00001 n**
FWRDEC	**R13**	**P00001 n**
ARDEC	**R11**	**N00001 n**
ARDEC	**R12**	**O00001 n**
THWRDEC	**NCR**	**Q00001 n**

Seed Record Card

A Seed Record Card **(Annex 7. *Seed Record Card)*** contains information of seeds per seedlot consistent with the information in the accomplished **Annex 1. *Detailed Information on Identified Seed Sources.*** Accomplish a seed record card per seedlot upon receipt of collected seeds from the field at the FTSC.

Seed Storage

Reasons for Seed Storage

- Seed ripening and collection do not correspond with the appropriate time for seedling production and planting.
- Seed source may be very far.
- Some species do not produce seed every year (seed-off-year).
- Storage is necessary before and while seeds are being shipped to planting area.
- During a "seed year", there is abundance of seeds. Excess seeds can be stored and be used for the next planting season or for future use.

Key Factors to Consider When Storing Forest Tree Seeds

- Species- the orthodox seeds can be stored for a long period of time while the recalcitrant and intermediate seeds cannot be stored since it will cause a significant decrease on their viability.
- Temperature – seeds remain viable for a long time in cold storage. The cooler, the better.
- Humidity – seeds store best under low air humidity.
- Moisture content – seeds at 8-12% MC are very ideal.
- Light – exposure to direct sunlight deteriorates seeds.
- Insect pests and diseases – temperature and humidity are the two most important factors. Low temperature and humidity deter the growth of pests and diseases.
- The best way to achieve optimal storage conditions is to store seeds in containers. Seed containers may be sacks, plastic bags, glass containers and tin cans.

Note: *Seed storage room should be cool, dry, dark and well ventilated. Seed storage of other suitable species are listed in* ***Appendix 4. Seed Testing of Forest Plantation Species.***

Seed Certification for Non-DENR Sources

Seed certification is a legally sanctioned system for quality control. It involves field inspection and seed quality tests. Fill out **Annex 8:** ***Seed Certification Application Form***.

The process of Seed Certification is illustrated below:

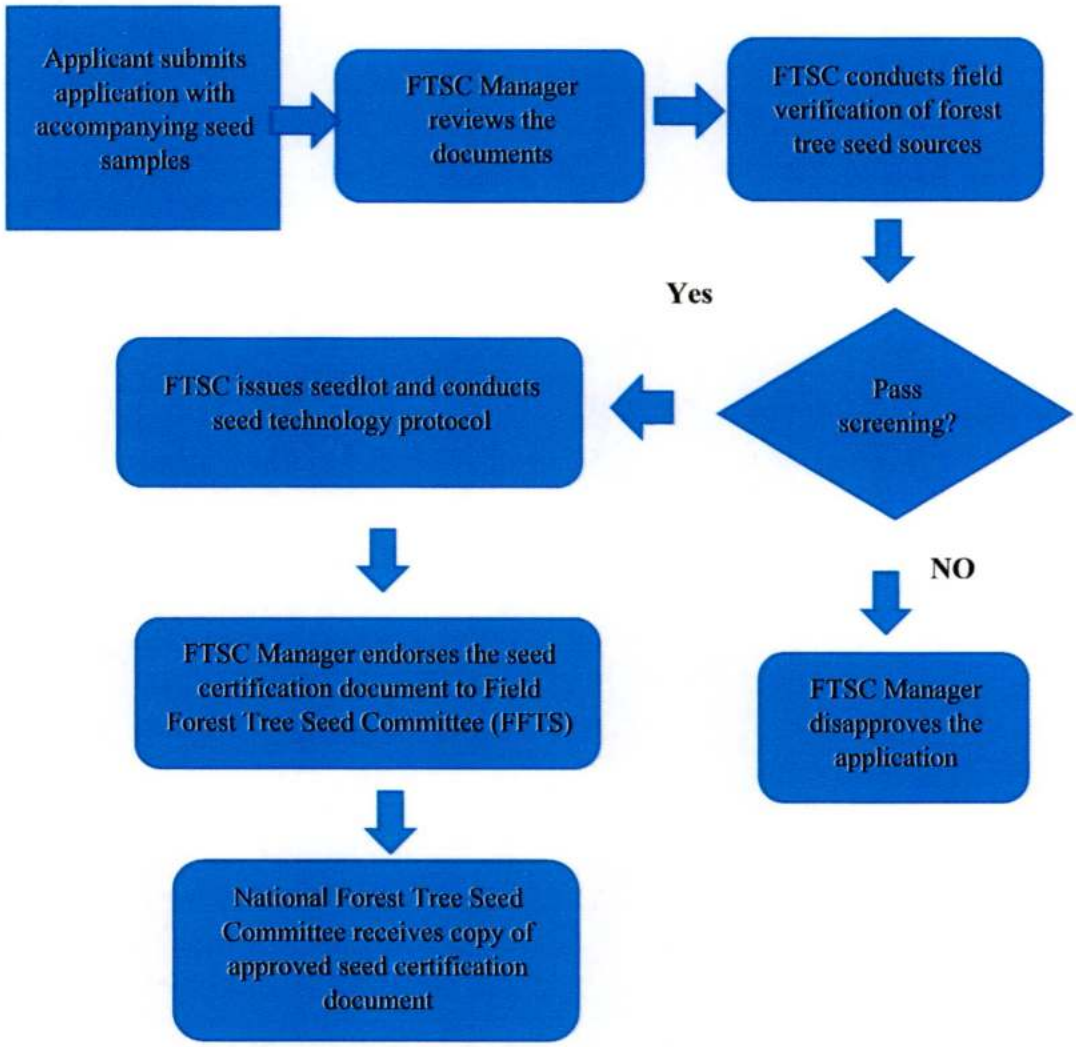

Figure 4. The Seed Certification Process

Certification of Forest Seed Sources for Non-DENR Applicants

The FTSC Manager reviews the documents filed or submitted by the applicant, whether it is an individual or from a cooperative, corporation, academe, LGUs, POs, NGOs, and other interested groups. These documents for review are: **Annex 10.** ***Application for Seed Source Certification****; and* **Annex 11.** ***Seed Sources Certification Form.***

The procedures in the certification of Forest Tree Seed Sources are as follows:

1. The FTSC Manager conducts field verification and assessment of the forest seed sources to be certified using the following criteria:
   a. The seeds must be produced in suitable areas as discussed in the establishment of seed sources.
   b. The characteristics of parent/plus trees in the area shall be considered.
      - Height – the tree crown or branches occupy the highest level of the stand of trees.
      - Diameter – diameter of the bole or trunk is as big as possible for the species.
      - Bole – the bole or trunk of the tree is uniformity straight from the base to the top.
      - Crown – the branches of the tree are equally distributed.
      - Health – tree is free from pest, diseases and defects.

2. If the application has passed the review and assessment, the FTSC Manager endorses the certification document to the FFTSC for approval.

3. The concerned FTSC issues the original copy of the certification of forest tree seed sources to the applicant, retains a photocopy at the FTSC and submits another copy to the NFTS Committee.

The process of Forest Seed Sources Certification for Non-DENR Applicants is illustrated below:

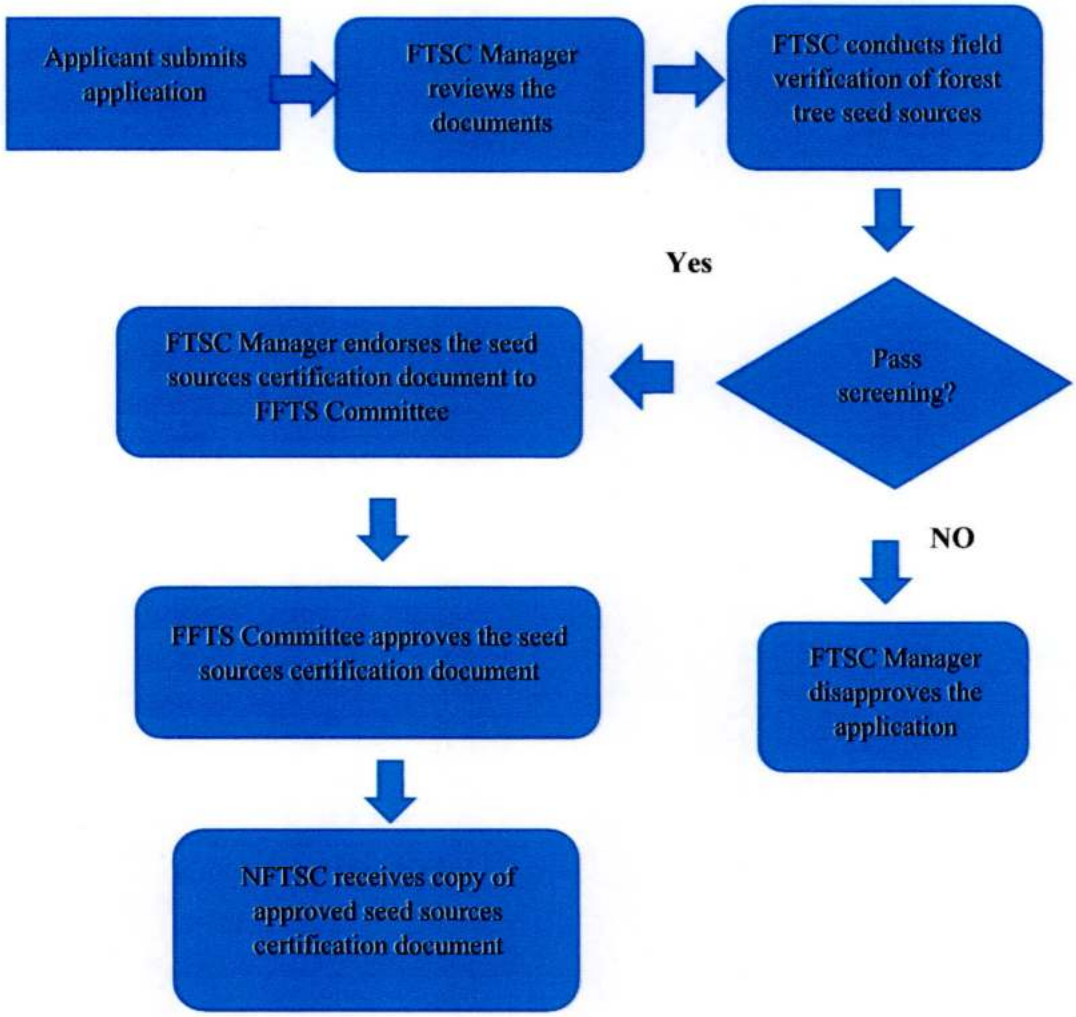

Figure 5. The Forest Seed Sources Certification Process for Non-DENR Applicants

Accreditation of Forest Tree Seed Supplier for Non-DENR Applicant/s

The following are the procedures to be followed for the accreditation of forest tree seed suppliers:

1. The FTSC Manager reviews the application form *(***Annex 12.** ***Application Form for Accreditation of Forest Seed Suppliers)*** and supplementary documents of the forest seed supplier applying for accreditation. The seeds must come from identified and certified seed sources.
2. The FTSC Manager assesses and validates the information indicated in the filled-out **Annex 13.** ***Forest Seed Suppliers Accreditation Document***.
3. If passed the assessment, the FTSC Manager endorses the application for accreditation of seed suppliers to the FFTSC for approval.
4. The concerned FTSC issues the original copy of the accreditation to the applicant, retains a photocopy at the FTSC and submits another copy to the NFTS Committee.

Note: *(a) The Accreditation Document shall be valid for a period of two years.*
(b) The continuance, suspension or cancellation of the accreditation shall be determined by the performance of the seed supplier.

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GLOSSARY OF TERMS

Dehisce- to split open at maturity to discharge contents

Desiccator- laboratory equipment being used to prevent immediate drying up of materials

Germinant- newly emerged seedlings

Germination-resumption of active growth in the embryo of a seed which is demonstrated by the protrusion of the radicle and other essential structures leading to normal plant development.

Germination test-used to determine seed viability

Intermediate seed-seed that can be dried to low moisture content like orthodox but sensitive to low temperature like recalcitrant seeds.

Macerate- the process of removing the fleshy portion of fruits previously soaked in tap water or rotten for 2-3 days by the use of hands.

Manual Nicking-individual clipping of seed which is done by cutting a small portion of the seedcoat at the distal end of the seed.

Orthodox seed- has relatively low moisture content (<13%) and there is no detrimental effect of lowering the moisture content up to 4%.

Phenology -the study of the growth and development especially the flowering and fruiting of plants in relation to the climatic and site factors.

Recalcitrant seed-has relatively high moisture content (<13%-80%) and any reduction in moisture content tends to decrease the value of viability.

Seed count –process of determining the actual number of pure seed usually in kg and can be used as the basis in calculating the number of seedlings that can be produced in 1kg seed weight.

Seed dormancy-the state of arrested development whereby the seed, by virtue of its structure or chemical composition, may possess one or more mechanisms preventing its own germination.

Seed extraction-process of removing or physically releasing the seed from their enclosing fruit structures.

Seed Sampling-method to obtain samples which are representative of the lot to assure homogeneity of the samples submitted for testing.

ISTA-International Seed Testing Association

ANNEXES

Annex 1. Detailed Information on Identified Seed Sources

Location: _____

Species Name (Botanical): _____ Species Code: ____

(Local/vernacular) :

Owner/Contact Person: _____

Date: _____

Latitude: _____ Longitude: _____

Altitude: _____

Detailed description of how to reach the site: _____

_____

_____

Map Reference: _____

Access Road Description: _____

Natural Boundaries: _____

Site Description:

Topography/Aspect: _____

Soil Type: _____ Drainage : _____

General Description:

Climate Rainfall (mm): Min.: _____ Mean: _____ Max: _____

Month of dry season: _____

Stand Description

Total Area (hectares): _____ Year Established: _____

Establishment method (Natural/Plantation):

_____

Associated important species: _____

Trees per hectare (all species) _____

Description of uniformity of spacing or grouping of trees _____

_____

Protection and Management Needs:

_____

Remarks: _____

Annex 2. Seed Tree Assessment Table

Species: _____
Location/Site: _____
Provenance: _____

Tree No.	GPS Reading		Stem					Branching Habit			Tree Health
	Easting	Northing	DBH (cm)	Height (m)	Straightness/ Form	Axis Persistence/ Forking	Circularity	Angle	Thickness	Pruning	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
Sum											
Mean											
Var.											

Annex 3. Phenology Calendar Form

Location: _____

PHENOLOGY CALENDAR

No.	Common Name	Scientific Name	MONTHS											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Note:

Leaf legends	**blue line**
Flower legends	**red line**
Fruit development	**green line**
Maturity/collection	**brown line**

Annex 4. Seed Purity, Seed Count and Seed Moisture Content Test

Species: _____ Origin: _____
Seedlot: _____ Sampling Date: _____

Annex 4.1. Purity Test

Purity % = $\frac{Weight\ of\ pure\ seeds}{Total\ Weight\ of\ the\ original\ sample} x100$ Purity % = _____ $x100$

Purity % = _____

Comments: _____

Annex 4.2. Seed Count Test

Instrument used: _____
Weight (g): _____
Replicate Count 1: _____
Replicate Count 2: _____
Replicate Count 3: _____
Average Seed Count: _____
Comments: _____

Annex 4.3. Seed Moisture Content

Time In: _____ Time Out: ____

Room Temperature: _____ °C Relative Humidity: _____

Instrument Used:

☐Moisture Meter		☐Oven Dry Method	
Weight (g)	_____	Weight (g)	_____
Replicate 1:	_____	Replicate 1:	_____
Replicate 2:	_____	Replicate 2:	_____
Replicate 3:	_____	Replicate 3:	_____
Average MC:	_____	Average MC:	_____

Comments: _____

Note:

%MC = $\frac{M_2-M_3}{M_2-M_1} x100$

Where: M1 = Weight of the container
M2 = Weight of the container + seed before oven drying
M3 = Weight of the container + seed after oven drying

Tested by: _____ Signature: _____
Date Accomplished: _____

Annex 5. Germination Test Form

_____ Tree Seed Center

Species: _____ Seedlot/Field No.: _____
Origin: _____ Altitude: _____ Collection Date: _____
Supplier: _____ Date Received: _____ Amount: _____
Methods: _____ Representative weight (g) _____ Replications: _____
Pre-treatment: _____ Sown Date: _____ Germination begun: _____
Previous viability for species: _____ grams or count _____
Based on _____ Count days _____

Date Examined	Test Period	Replicates													
(twice a week)	(days)	1		2		3		4		5		6		7	
		GS	AS	GS	AS	GS	AS	GS	AS	GS	AS	GS	AS	GS	AS
Number of Moldy Seeds															
Weight of replicate or count															
No. of germination/dish															
Squash Test/Firm/dish															
Replicate Average Viability/10g															
Replicate Average Germination %															

Bulk Calculation:

Index:

Average of __ Replicates: _____
Average Viability: _____ /10g
Average of Germination: _____

GS – Good Seeds
AS – Abnormal Seeds

A= Albino
C= Abnormal cotyledon
R=Abnormal radicle
H= Abnormal hypocotyl
M= Moldy seedling

Enter on Card ☐
Private Seed Test ☐
Retest ☐
Write Off ☐

Comments: _____

Annex 6. Seed Health Testing Form

Species: _____ Method of Testing: _____
Scientific Name: _____ Date Tested: _____
Sample Number: _____ Date Collected: _____
Place Collected: _____

	Plate Number										Remarks
	1	2	3	4	5	6	7	8	9	10	
Germination											
Organism/ % Infection											

Annex 7. Seed Record Card

Seedlot No.	Species Code	Botanical Name	Store Code	Cost Code

EXACT LOCALITY OF COLLECTION	PARENT TREE (S)	SEED
Barangay:	☐ In bulk No. of Parents	Collector:
City/Municipality:	☐ Individual tree	Collectors No.:
Province:		Collection Date:
Latitude (N) Longitude (E)	DBH (cm):	Project:
Altitude (m) Aspect	Total Height (m):	Identified by:
Slope	Form:	Condition:
Geology and Soil:	Remarks:	Storage: ☐ 18 to 22°C ☐ 3 to 5°C ☐ -15 to -18°C
pH		Quantity (g):
Forest Type:	Fumigation Method:	GERMINATION
Associate Trees:		Method / Date From / Date To / Viability /10g (%)
	Date:	

Seedlot No.		DISTRIBUTION	Amount received (in grams):	
File No.	Date	Consignee	Amount Sent	Amount Left

Annex 8. Application for Seed Certification

A	
Name: _____	Date: _____
Address: _____	Intended Purpose:
Species: _____	☐ Proposed Breed _____
Year of Collection: _____ Collection No.: _____	☐ Seed Region _____
Quantity of Collection (in kg): _____	
Quantity of Seed Extracted (in kg): _____	
Location of Seed Source	Type of Stand
Barangay: _____	☐ Natural Stand
City/Municipality: _____	☐ Plantation
Province: _____	Year Established: _____

B	Use This Box For: **Native Species or Non-Orchard Lots**
Parent Stand Seedlot No. _____	
Registered Seed Stand No. or Parentage: _____	
No. of trees from which seed was collected: _____ (*under 20 state number, over 20 estimate*)	
No. of trees in Parent Stand: _____	
Size of collection area (in ha): _____	
Species neighboring seed collection area are: _____	
☐ Mixed Stand ☐ Pure Stand	
If mixed stand, state other species or forest association: _____	
Latitude (N) _____ Longitude (E) _____	
Altitude (masl): _____	
Note: Include a detailed map of the seed collection area	

Use This Box For:	**Clonal Seed Orchard or Control-Pollinated Seed Orchard**	C
Clonal Series: _____	No. of Clones Planted: _____	
No. of clones remaining after thinning: _____		
No. of clones from which seed was collected: _____		
Date orchard was last thinned: _____		
Distance from external pollen source (m): _____		
Type of Pollination:		
☐ Open-pollinated		
☐ Control-pollinated		
Seed parentage description or clone number of parent trees: _____		

D	Has seed from this source previously been certified? ☐ Yes ☐ No
If Yes, show the Classification and Seedlot No. previously certified:	
Has anything been done to the seed source that warrants a change in classification? ☐ Yes ☐ No	
If Yes, state changes _____	
The foregoing information gives a correct description of the seedlot collected.	
Signed _____ Designation _____	

Certified by the Seed Certification Service as:	E
Species: _____	
Species Code: _____	
Seedlot No.	
Provenance or Clone Name: _____	
Special Comments: _____	
Chairman _____ Date _____	
Received: _____ Register: _____	

Annex 8. Application for Seed Certification

Note:

Box A – provides information on supplier or collector, species and seed quantity.

Box B – describes the origin, size and type of parent stand, and has provision for recording the latitude, longitude, and altitude of species collections.

Box C is to be used for collections of clonal materials

Box D is to be completed by the applicant in all cases. At the bottom is the supplier guarantee of seed identity.

Box E is for Seed Certification Service Unit

After processing by the Seed Certification Service Unit, an approved application becomes the certificate.

Source: Vincent TG. 1987. Certification System for Forest Tree Seed and Planting Stock. FRI Bulletin No. 134 Ministry of Forestry Forest Research institute Rotorua, New Zealand.

APPENDIXES

Appendix 1. Phenological Data of Forest Plantation Species

Species	Region	Seed Sources	Phenological Data			
			Flowering	Fruiting	Maturity	Seed Collection
Agoho	II	Cabagan, Isabela	Jan.	Mar.-Apr.	Aug.	Aug.
	III	Bulacan	Dec.-Jan.	Mar.	May-June	June-Aug.
	IV-A	Laguna	Dec.-Jan.	Feb.-Mar.	May-June	June-July
	IV-B	Palawan	Apr.-May	June	June-July	June-July
	V	Legaspi	Feb.-Mar.	May	July-Aug.	Aug.-Oct.
	VIII	Leyte	Nov.-Dec.	Nov.-Dec.	July	Aug.
Auri	I	Pangasinan	Oct.	Nov.-Dec.	Jan.-Feb.	Mar.-Apr.
	II	Region wide	Aug.-Sept.	Sept.-Oct.	Oct.-Nov.	Dec.-Jan.
	III	Mariveles, Bataan	Oct.	Nov.	Dec.	Dec.
		Carrangalan, N. Ecija	Oct.-Nov.	Dec.-Jan.	Feb.-Mar.	Mar.-Apr.
		Fort Magsaysay, N. Ecija	Nov.	Dec.	Mar.	Mar.-Apr.
			Oct.-Nov.	Nov.-Dec.	Jan.-Feb.	Mar.-Apr.
		Norzagaray, Bulacan	July	Aug.	Sept.-Oct.	Nov.
		Masinloc, Zambales	Aug.	Sept.-Oct.	Nov.	Dec.
	IV-A	Olongapo, Zambales	July-Aug.	Sept.-Oct.	Nov.-Dec.	Dec,-Jan.
		Mount Makiling, Laguna				
Bagras	XII	Bagumbayan, Sultan Kudarat	Aug.-Sept.	Oct.-Nov.	Dec.-Jan.	Jan.
		Sarangani	Feb.-Mar.	Apr.	May	June
	XIII	PICOP	Mar.-Apr.	May-June	July-Aug.	Sept.-Oct.
Benguet pine	Car	Baguio City	-	-	-	Dec.-Jan.
		Mt. Province	-	-	-	Dec.-Jan.
Falcata	I	Ilocos Sur	Dec.	Nov.	Dec.	Jan.
	II	Nueva Vizcaya	Apr.	June	July	Aug.
	IV-A	Laguna	Oct.-Nov.	Dec.-Feb.	Mar.	Apr.-May
	XII	Sultan Kudarat	Aug.-Sept.	Oct.-Nov.	Dec.-Jan.	Jan.
	XIII	Agusan	Aug.-Sept.	Oct.-Nov.	Dec.-Jan.	Sept.
Giant ipil-ipil	Region wide	Region wide	All year round	All year round	All year round	All year round
Gubas	VIII	Leyte and Samar	May	May	May	May
Kaatoan-bangkal	I	Ilocos Norte	Mar.-Apr.	May-June	July-Aug.	June-July
		Ilocos Sur	May	June-Aug.	Sept.-Oct.	Nov.-Dec.
	II	Nueva Vizcaya	May	-	Oct.	Oct.
	IV-A	Mt. Makiling, Los Baños	-		-	July-Aug.
Kakawate	I	Pangasinan	Feb.-Mar.	Apr.-May	May	June
	III	Nueva Ecija	Jan.-Feb.	Feb.-Mar.	Apr.-May	June
		Norzagaray, Bulacan	Jan.	Jan.-Feb.	Feb.-Mar.	May-June
			Feb.	Mar.	Apr.	May-June

Species	Region	Seed Sources	Phenological Data			
			Flowering	Fruiting	Maturity	Seed Collection
		Doña Remedios				
	IV-A	Trinidad, Bulacan	Mar.	Apr.	May	June
		Laguna	Mar.	Apr.-May	June	June-July
		Quezon	Mar.	Apr.-May	June	June-July
		Batangas				
Mahogany	CAR	Benguet, Abra	Mar.-June	June-July	July-Aug.	Aug.-Sept.
	I	PFDPIN Proj. Ilocos	May-June	July-Oct.	Nov.-Dec.	Dec.-Jan.
		Norte	May-June	July-Oct.	Nov.-Dec.	Dec,-Jan
		Marcos, Nueva Era,				
		Ilocos Norte	May-June	July-Oct.	Nov.-Dec.	Dec.-Jan.
		Caniaw Refo Proj.,				
		Ilocos Norte	Mar.-Apr.	June-Oct.	Nov.-Dec.	Dec.
	II	Mangatarem,	Mar.	Apr.-Dec.	Dec.	Jan.-Feb.
	III	Pangasinan	Apr.-May	June	Jan.-Feb.	Mar.
		Region wide	Apr.-June	July-Nov.	Dec.	Jan.
		Norzagaray, Bulacan				
		Doña Remedios	May-June	July-Aug.	Dec.	Mar.
		Trinidad, Bulacan	July	Aug.-Oct.	Nov.-Dec.	Jan.
		Camiling, Tarlac	Apr.	May-June	Oct.-Nov.	Dec.-Jan
		Masinloc, Zambales	May-June	July-Aug.	Nov.-Dec.	Jan.
		Pilar, Bataan	Apr.-May	June	Jan.-Feb.	Mar.
		Carranglan, Nueva Ecija	May	Apr.-May	Sept.	Sept.
	IV-A	Gapan, Nueva Ecija	Apr.-May	June-Oct.	Nov.-Dec.	Dec.-Jan
		Arayat, Pampanga				
		Kinabuhayan, Dolores,	Apr.-May	June-Oct.	Nov.-Dec.	Dec.-Jan.
		Quezon	Apr.-May	June-Oct.	Nov.-Dec.	Dec.-Jan.
		QNP, Quezon	June	July-Nov.	Dec.	Jan.-Mar
	V	Mt. Makiling, Laguna	May-June	July-Oct.	Nov.-Dec.	Dec.-Jan.
		Camarines Sur and	Apr.-May	June-Nov.	Dec.	Jan.-Mar.
		Albay	Apr.-May	June-Nov.	Dec.	Jan.-Mar.
		Naga City				
	VII	Dumarao, Capiz	Apr.-May	June-Nov.	Dec.	Jan.-Mar.
		Osmeña Refo Proj.,	Feb.-Apr.	May-Oct.	Nov.-Dec.	Jan.-Mar.
	VIII	Cebu City				
	IX	Leyte and Samar	Feb.-Apr.	May-Oct.	Nov.-Dec.	Jan.-Mar.
		Baluno Refo Proj.,				
		Zamboanga City	Feb.-Apr.	May-Oct.	Nov.-Dec.	Jan.-Mar.
		Dipolog, Zamboanga del				
	X	Norte	Mar.-May	July-Aug.	Sept.-	Dec.-Mar.
		Malasag Refo Proj.,			Nov.	
		Bukidnon	Aug.-Sept.	Oct.-Nov.		Jan.-Mar.
		Impalutao Refo Proj.,			Dec.-Jan.	
		Bukidnon	Sept.	Nov.-Dec.		Feb.-Mar.
		Sumpong, Malaybalay			Jan.-Feb.	
	XI	City	Oct.	Nov.-Dec.		Feb.
		Sto. Tomas, Davao del	Sept.	Nov.	Jan.-Feb.	Mar.-April
	XII	Norte	May-June	June-Oct.	Feb.	Jan.-Mar.
		Sultan Kudarat	May-June	June-Oct.	Nov.-Dec.	Jan.-Mar

Species	Region	Seed Sources	Phenological Data			
			Flowering	Fruiting	Maturity	Seed Collection
	XIII	Sarangani Province Agusan Lianga, Surigao del Sur			Nov.-Dec.	
Malapapaya	I	Ilocos Norte	Jan.-Feb.	Mar-Apr.	May	June-July
		Caniaw, Ilocos Sur	May-June	July-Aug.	Sept.-Oct.	Nov.-Dec.
		Mangatarim, Pangasinan	Nov.-Dec.	Mar.-May	July	Sept.-Oct.
			Mar.-Apr.	May-June	Aug.-Oct.	Nov.-Dec.
	IV-A	Calauag, Quezon	Apr.-May	July-Aug.	Oct.-Nov.	Nov.-Dec.
		Cavinti and Luisiana, Laguna	Apr.-May	May-June	Aug.-Sept.	Oct.-Nov.
		Pagbilao, Quezon	Apr.-May	June-July		Dec.-Jan.
		Calamba, Laguna	Jan.-Feb.	Mar.-Apr.	Oct.-Nov.	June
			April-May	June-July	May	Nov.-Dec.
		Pitogo, Quezon	July-Aug.	Sept.-Oct.	Sept.-Oct.	Jan.-Mar.
		Gumaca, Quezon	Aug.	Sept.-Oct.	Jan.-Feb.	Jan.-Mar.
		Macalelon, Quezon	July-Aug.	Sept.-Oct.	Jan.-Feb.	Jan.-Mar.
			Aug.	Sept.-Oct.	Jan.-Feb.	Jan.-Mar.
			June	July-Aug.	Jan.-Feb.	Oct.-Nov.
	IV-B	Bagumbayan, Palawan	May-July	July-Dec.	Sept.-Oct.	July-Sept.
	V	Sooc, Camarines Sur	Oct.-Nov.	Dec.-Feb.	Apr.	Sept.-Nov.
		San Roque, Sorsogon	Sept.-Oct.	Nov.-Dec.	Sept.	Jan.-Feb.
	VIII	Leyte and Samar	Apr., May	June-July	Dec.-Jan.	Sept.
	XI	Maco, Mabini, Compostela Valley	June	July-Aug.	Aug.-Sept.	Sept.-Dec.
	XIII	Maharlika, Bislig City				
Mangium	II	Diadi, Nueva Vizcaya	Aug.	Sept.-Oct.	Nov.-Jan.	Jan.-Feb.
	III	Mariveles, Bataan	Oct.	Nov.	Dec.	Dec.
		Fort Magsaysay, Nueva Ecija	Oct.-Nov.	Nov.-Dec.	Jan.-Feb.	Mar.
		ANZAP, Mayantoc, Tarlac	Mar.	Mar.	Apr.	Apr.-may
			July	Aug.	Sept.-Oct.	Nov.
		Masinloc, Zambales	Sept.-Oct.	Nov.-Dec.	Jan.-Feb.	Feb.-Mar.
	IV-B	Victoria, Oriental Mindoro	Sept.-Oct.	Nov.-Dec.	Jan.-Feb.	Feb.-Mar.
			Mar.-Sept.	Apr., Oct.	Dec.-Jan.	Dec.-Jan.
	IV-A	Ternate, Cavite	-	-	-	July
	XII	Glan, Sarangani	-	-	-	June-Sept.
	XIII	NALCO PICOP				
Molave	CAR	Abra Camp 3, along Kennon Road, Benguet	May-July	July-Aug.	Aug.-Nov.	Nov.
	I	Ilocos Norte	Jan.-Feb.	Mar.-Apr.	May	June-July
		Vintar	Dec.	Jan.	Mar.	Mar.
		La Union	Nov.	Dec.-Mar.	Apr.	Apr.
		Caniaw, Taleb, Bantay, Ilocos Sur	Dec.	Jan.-Feb	Mar.	Apr.
			Apr.-May	June	July-Aug.	Aug.-Sept.

Species	Region	Seed Sources	Phenological Data			
			Flowering	Fruiting	Maturity	Seed Collection
		Dasol and Mangatarem ,				
	NCR	Pangasinan	Mar.-Apr.	May-June	July	Aug.-Sept.
		Luneta Park, Manila	Aug.-Sept.	Oct.-Nov.	Jan.-Feb.	Mar.-Apr.
	II		June	June	Aug.	Aug.
		Diadi, Nueva Vizcaya	June	July-Aug.	Oct.	No.
		Diffun, Quirino	July-Aug.	July-Sept.	Dec.	Jan.
	III	Peñablanca, Cagayan	May	June-July	July-Aug.	Aug.-Sept.
		North Luzon Expressway (Bulacan,				
	IV-A	Pampanga, Tarlac)	May-June	July	July-Aug.	July-Aug.
		Pagbilao, Quezon	June-July	July-Aug.	Sept.	Sept.-Oct.
		Mt. Makiling, Laguna	Mar.-Apr.	May	July-Aug.	Aug.-Sept.
		Filinvest, Alabang	Aug.-Sept.	Oct.-Nov.	Jan.-Feb.	Mar.-Apr.
			Aug.-Sept.	Oct.	Nov.	Dec.-Jan.
		Macalelon, Quezon	Aug.-Sept.	Oct.	Nov.	Dec.-Jan.
		Pitogo, Quezon	Aug.-Sept.	Oct.	Nov.	Dec.-Jan.
		Agdongan, Quezon	May-June	July-Aug.	Sept.	Sept-.Oct.
		IRRI, Los Baños,	Apr.	May	July	Oct.-Dec.
	V	Laguna	May	July	Sept.-Oct.	Oct.-Dec.
		San Roque, Sorsogon	May	June-July	Sept.-Oct.	Oct.
		Masbate and Sorsogon	Apr.-May	May	May-June	July
	VI	Catanduanes	May-June	July-Sept.	Oct.-Nov.	Oct.-Nov.
	IX	Capiz				
		Pasonanca, Cabanatuan and Manicahan	Jan.-Feb.	Mar.-May	July-Sept.	Aug.-Sept.
	X	Zamboanga City	Aug.-Sept.	Oct.-Nov.	Dec.-Jan.	Jan.
	XII	Kitaotao, Bukidnon				
		Columbio-Talayan, Sultan Kudarat	Mar.-Apr.	Mar.-Apr.	May	June
		Alabel, Malungon, Malapatan, Glan, Sarangani				
Narra	CAR	Bangued, Abra, Camp 4, along Kennon Road, Benguet	Mar.-May	Sept.-Dec.	Jan.-May	May
	I	Ilocos Norte	Apr.	May-June	July-Aug.	Sept.
		La Union	May	June	Aug.-	Sept.-Oct.
		Ilocos Sur	Apr.-May	June-July	Sept.	Sept.
	III	Pilar, Bataan	Mar.	Apr.-May	Aug.	July
		Mariveles, Bataan	Apr.	June	June	Nov
		Carranglan, N. Ecija	Apr.	May-June	Oct.	Nov
		Gen. Tinio, N. Ecija	Mar.	Apr.-May	Sept.-Oct.	July
		Angat, Bulacan	Mar.-Apr.	May	June	Aug.-Sept.
		San Rafael, Bulacan	Apr.-May	June-July	July	Sept.
		Floridablanca,	Apr.	July	Aug.	Sept.-Aug.
		Pampanga	Apr.	May	Aug.	Aug.
		Masinloc, Zambales	Apr.-May	June-July	June-July	Sept.
	IV-A	Olongapo, Zambales	Mar.-Apr.	May-June	July	July-Sept.

Species	Region	Seed Sources	Phenological Data			
			Flowering	Fruiting	Maturity	Seed Collection
		Mt. Makiling, Laguna	Mar.-Apr.	May-June	June	July-Sept.
		Calauag, Quezon	Mar.-Apr.	May-June	June	July-Sept.
		Batangas City	Mar.-Apr	May-June	June	Aug.-Sept.
		Lopez, Quezon	Mar.-Apr	May-June	July	Aug.-Sept.
		Gumaca, Quezon	Mar.-Apr	May-June	July	Aug.-Sept.
		Pitogo, Quezon	Mar-Apr.	May	July	July-Sept.
	IV-B	Pagbilao, Quezon	May	June	June	Aug.-Sept.
		Palawan Experimental Forest	Apr.-May	June	July	Aug.
		Agtiwa, San Fernando, Romblon	Apr.-May	June	July	Aug.
	V	Torrijos, Marinduque	May	June-Aug.	July	Nov.-Dec.
		Albay	Oct.-Nov.	Jan.	Sept.-Oct.	May-July
		Legaspi	Mar.-Apr.	Apr.-May	Mar.	June-Aug.
		Sorsogon	Oct.	Dec.	June	Apr.
		Masbate	Dec.	Feb.	Feb.	May
		San Jacinto	Dec.	Feb.-Apr.	Apr.-May	July-Sept.
	VI	Camarines Sur	Mar.-Apr.	Apr.-May	July	July-Aug.
		Lambunao, Iloilo	Apr.	May-June	July	-
	VII	Capiz	Mar.-Apr.	Apr.-May	-	July-Aug.
		Lantawan, Cebu City	Mar.	Apr.-Aug.	July	Sept.
		Camp 7, Minglanilla,	Mar.-Apr.	Mar.-Apr.	Aug.	Nov.-Dec.
	VIII	Cebu	Dec.	Feb.	Sept.	May
	XI	Leyte	Aug.-Sept.	Sept.-Oct.	Apr.	Jan.
	XII	Davao del Norte			Dec.-Jan.	
		Esperanza-Bagumbayan,	Mar.-Apr.	Mar.-Apr.		June
		Sultan Kudarat	-	-	May	June-Sept.
		Sarangani Province			-	
Raintree	III	General Tinio, N. Ecija	Apr.-May	June-July	July-Aug.	Aug.
		Angeles, Pampanga	July-Aug.	Aug.-Sept.	Sept.-Oct.	Oct.
		Baliuag, Bulacan	Apr.	June	July	Aug.
	IV-A	Mt. Makiling, Laguna and Pagbilao, Quezon	May-June	Aug.	Sept.-Oct.	Nov.-Dec.
		Batangas City	May-June	Aug.-Sept.	Oct.	Nov.-Jan.
		Sariaya, Quezon	May-June	Aug.-Sept.	Nov.	Nov.-Jan.
	V	Albay, Sorsogon	-	Dec.	Feb.-Mar.	Apr.-June
	XII	Esperanza-Bagumbayan, Sultan Kudarat	July-Aug.	Sept.-Oct.	Nov.-Dec.	Dec.
		Sarangani Province	Mar.-Apr.	Apr.-May	July	July-Aug.
Teak	II	Tuguegarao	Mar.-Apr.	May	June-July	July-Aug.
	III	Bataan; Mayantok Park	Apr.-May	May-June	July	Aug.-Sept.
	IV-A	Mt. Makiling, Laguna	Aug.-Sept.	-	-	-
	IV-B	Puerto Princesa,	June	July-Aug.	Sept.	Sept.-Oct.
	VII	Palawan	Jan.	Mar.-May	Aug.	Sept.
	XII	Camp 4 and 7, Minglanilla, Cebu Bagumbayan, Sultan Kudarat	Aug.-Sept.	Apr.-May	Dec.-Jan.	Jan.

Species	Region	Seed Sources	Phenological Data			
			Flowering	Fruiting	Maturity	Seed Collection
Yemane	I	Ilocos Norte	Dec.-Jan.	Feb.-Mar.	Apr.	May
		Manleluag Refo, Pangasinan	Nov.-Dec.	Jan.-mar.	Feb.	Feb.-May
		La Union	Dec.-Jan.	Feb.-Mar.	Mar.	Mar.-Apr.
		Ilocos Sur	Jan.	Feb.	Mar.	Apr.
	II	Magat, Diadi, N.	Jan.-Feb.	Mar.-Apr.	May	June-July
	(SPA	Vizcaya	Jan.-Feb.	Mar.-Apr.	May	June-July
	site)	Nagtipunan, Quirino	Jan.-Feb.	Mar.-Apr.	May	June-July
		Solona, Cagayan	Feb.-Mar.	Mar.-Apr.	May	June
	III	Mariveles, Bataan				
	(SPA		Dec.-June	Feb.-Mar.	Apr.-June	May-June
	site)	Pagbilao, Quezon	Feb.-Mar.	Apr.-May	May	May-June
		Mt. Makiling, Laguna	Mar.-Apr.	May	June	June-July
	IV-A	Palawan Experimental Forest Bagumbayan,				
	IV-B	Napsana, Palawan	Jan.-Apr.	Apr.	May-June	June
		Capiz; Iloilo	Jan.-Apr.	Apr.	May-June	June
		Culasi, Antique (SPA)	Jan.-Feb.	Mar.-May	May-June	June-July
	VI	Osmeña Refo Proj., Cebu City	Jan.-Feb.	Mar.-May	May-June	June-July
	VII	Central Cebu Refo Proj.,				
	(SPA	Cebu City	Jan.-Feb.	Mar.-May	May-June	June-July
	site)	Nagaasan, Babatngon, Leyte	Feb.-Mar.	Apr.-May	June	June-July
		Dipolog, Zamboanga del				
	VIII	Norte	Feb.-Mar.	Apr.-May	June	June-July
	(SPA	Malaybalay, Bukidnon				
	site)		Feb.-Mar.	Apr.-May	June	July
	IX	Nabunturan, Davao del				
	(SPA	Norte	Feb.-mar.	Apr.-May	June	July
	site)	Sto. Tomas, Davao del				
	X	Norte	Feb.-Mar.	Apr.-May	June-July	July
	(SPA	Esperanza-Tacurong,				
	site)	Sultan Kudarat	Oct.	Nov.	Feb.	Mar.
	XI	Alabel, Malungon,		Jan.-Feb.		
	(SPA	Sarangani	Nov.-Dec.		Mar.	Apr.
	site)	Agusan				
	XII					
	XIII					

Appendix 2. List of Established Seed Sources

Region	PENRO	Location	Seed Source Type	Species
CAR	Abra	Bangued, Abra San Marcial, San Isidro, Abra	IPTs	Narra, Molave, Banaba, Teak, Mahogany, Gmelina
CAR	Apayao	Guinaang, Conner, Apayao	IPTs	Narra, Mixed forest trees
CAR	Benguet	Bokbok-bisal, Bokod, Benguet Bangho, Daclan, Tublay, Benguet Pusdo, Bulalacao, mankayan, Benguet	IPTs	Benguet Pine
CAR	Ifugao	Amtundog, Asipilo, Ifugao	IPTs	Narra, Malasantol
CAR	Kalinga	Pakawit, Pinukpuk, Kalinga	SPA	Gmelina
CAR	Mountain Province	Sitio Datacan, Gueday, Besao, Mountain Province	IPTs	Benguet Pine
Region 1	Ilocos Norte	Piddig, Ilocos Norte Sagpat, Vintar, Ilocos Norte Bimangga, Currimao, Ilocos Norte	IPTs	Narra, Baguilumbang, Duhat, Agoho
Region 1	Ilocos Sur	Elefante, Banayoyo, Ilocos Sur Caniao, Bantay, Ilocos Sur Besang Pass, Cervantes, Ilocos Sur Man-atong, Suyo, Ilocos Sur	IPTs	Narra, Benguet pine, Teak, Molave
Region 1	La Union	Pugo, La Union	IPTs	Teak, Mixed forest trees
Region 1	Pangasinan	Manleluag, Pangasinan Mabini Refo Project, Pangasinan	IPTs	Mahogany, Gmelina, Narra, Agoho
Region 2	Batanes	Municipalities of Basco, Ivana, Uyugan and Sabtang, Batanes	IPTs	Bitaog, Antipolo, Kamagong
Region 2	Cagayan	Piggatan, Alcala, Cagayan Nassiping, Gattaran, Cagayan Nanarian and Callao, Penablanca, Cagayan	IPTs	Mahogany, Narra, Molave, Agoho, Kupang
Region 2	Isabela	Cordon, Isabela	SPA	Gmelina

Region	PENRO	Location	Seed Source Type	Species
Region 2	Nueva Vizcaya	Magat Reforestation Project, Bugnay, Diadi, Nueva Vizcaya	IPTs	Narra, Gmelina
Region 2	Quirino	Diffun and Nagtipunan, Quirino	IPTs	Malapapaya, Mahogany, Gmelina, Molave, Narra
Region 3	Aurora	Dinadiawan, Dipaculao, Aurora	SPA	Supa
Region 3	Bataan	Pilar, Bataan	SPA	Narra
Region 3	Bulacan	Doña Remedios Trinidad, Bulacan	SPA	Auri
Region 3	Nueva Ecija	Pantabangan, Nueva Ecija	SPA	Gmelina
Region 3	Pampanga	Arayat, Pampanga	SPA	Teak
Region 3	Tarlac	Mayantoc, Tarlac	SPA	Gmelina
Region 3	Zambales	Masinloc, Zambales	SPA	Agoho
Region 4A	Batangas	Sawang, Lobo, Batangas	IPTs	Philippine teak, Taluto
Region 4A	Cavite	Ternate, Cavite	IPTs	Narra, Mangium, Auri, Gmelina
Region 4A	Laguna	Cueva, Sta. Maria, Laguna	IPTs	Mt. Agoho, Batino
Region 4A	Quezon	Quezon National Park, Atimonan, Quezon	IPTs	Kamagong, Duguan, Mixed species
Region 4A	Rizal	Tanay, Rizal	IPTs	Benguet pine, Narra
Region 4B	Marinduque	Torrijos, Marinduque	IPTs	Narra
Region 4B	Occidental Mindoro	Mamburao, Occidental Mindoro	SPA	Narra

Region	PENRO	Location	Seed Source Type	Species
Region 4B	Oriental Mindoro	Bukal, Bongabong, Oriental Mindoro	IPTs	Auri, Gmelina
Region 4B	Palawan	Puerto Princesa City, Palawan	IPTs	Ipil, Pagsahingin
Region 4B	Romblon	Sibuyan Island, Romblon	IPTs	Narra
Region 5	Albay	Bacacay, Albay	IPTs	Agoho, Batino
Region 5	Camarines Norte	Labo, Camarines Norte	SPA	Mangium
Region 5	Camarines Sur	Lagonoy, Camarines Sur	IPTs	Mangrove species
Region 5	Catanduanes	San Miguel, Catanduanes	SPA	Narra
Region 5	Masbate	Brgy. Cabangrayan, Pio V. Corpus, Masbate	SPA	Molave
Region 5	Sorsogon	Prieto Diaz, Sorsogon	SPA	Bakauan bato
Region 6	Aklan	Bugtong Bato, Ibajay, Aklan	SPA	Agoho
Region 6	Antique	Abiera, Sebaste, Antique	SPA	Gmelina
Region 6	Capiz	Quinabonglan, Maayon, capiz	IPTs	Gmelina
Region 6	Guimaras	Taklong Island Marine Reserve, Nueva Valencia, Guimaras	IPTs	Bakauan-lalaki, Bakauan-babae, Pagatpat, Bungalon
Region 6	Iloilo	San Jose, Lemery, Iloilo	IPTs	Gmelina, Bagras
Region 6	Negros Occidental	Bacuyangan, Hinoba-an, Negros Occidental	IPTs	Narra, Mixed forest trees
Region 7	Bohol	Logarita, Bilar, Bohol	SPA	White lauan
Region 7	Cebu	Pañas, Dalaguete, Cebu	IPTs	Agoho
Region 7	Negros Oriental	Tambo, Ayungon, Negros Oriental	SPA	Mangium

Region	PENRO	Location	Seed Source Type	Species
Region 7	Siquijor	Olang, Maria, Siquijor	SPA	Molave
Region 8	Biliran	Villaconsuelo, Naval, Biliran	IPTs	Indigenous and Dipterocarp tree species
Region 8	Eastern Samar	Binalay, Gen. MacArthur, Eastern Samar	SPA	Bakauan-babae
Region 8	Leyte	Mahagnao Volcano National Park, Burauen, Leyte VSU, Baybay City, Leyte	IPTs	Mixed forest trees
Region 8	Northern Samar	Sabang Tabok, Lavezares, Northern Samar	SPA	Bakauan bato
Region 8	Samar	Buri Island, Catbalogan City, Samar Oyandic, Motiong, Samar Daram and Zumarraga Islands, Samar Tinago, Calbiga, Samar	SPA	Tangal/Mangrove species
Region 8	Southern Leyte	Matuasi, Ibarra, Maasin City	SPA	Mahogany
Region 9	Zamboanga del Norte	Baliguian, Zamboanga del Norte	SPA	Almaciga
Region 9	Zamboanga del Sur	Tinutongan, Tukuram, Zamboanga del Sur	SPA	Teak
Region 9	Zamboanga-Sibugay	Sandayong, Naga, Zamboanga Sibugay	SPA	Gmelina
Region 10	Bukidnon	Chincona Reforestation Project, Kaatoan, Lantapan, Bukidnon	IPTs	Mixed forest trees
Region 10	Camiguin	Mantigue Island, San Roque, Mahinog, Camiguin Pandan, Mambajao, Camiguin	IPTs	Mixed forest trees
Region 10	Lanao del Norte	Kolambungan, Lanao del Norte Kapatagan, Lanao del Norte	IPTs	Mixed forest trees and Mangrove species
Region 10	Misamis Occidental	Hoyohoy, Tangub City, Misamis Occidental	IPTs	Mixed forest trees

Region	PENRO	Location	Seed Source Type	Species
Region 10	Misamis Oriental	Malasag, Cugman, Cagayan de Oro City	IPTs	Mixed forest trees
Region 11	Compostela Valley	Las Arenas, Pantukan, Compostela Valley	IPTs	Mixed forest trees
Region 11	Davao del Norte	Asuncion, Tagum, Davao del Norte	IPTs	Mixed forest trees
Region 11	Davao del Sur	Malabog, Paquibato District, Davao City	IPTs	Mixed forest trees
Region 11	Davao Oriental	La Union, San Isidro, Davao Oriental	IPTs	Mixed forest trees
Region 12	North Cotabato	Brgy. Amas, Kidapawan City, North Cotabato	SPA	Gmelina
Region 12	Sarangani	Brgy. Poblacion, Malungon, Sarangani	SPA	Mahogany
Region 12	South Cotabato	Mt. Matutum Protected Landscape, Brgy. Maligo, Polomolok, South Cotabato	IPTs	Mt. Agoho, Pangnan, Philippine Igem
Region 12	Sultan Kudarat	Brgy. Chua, Bagumbayan, Sultan Kudarat	IPTs	Mixed dipterocarp and indigenous trees
Region 13	Agusan del Norte	Crossing, Kitcharao, Agusan del Norte	SPA	Agoho
Region 13	Agusan del Sur	Brgy. Mahayahay, San Luis, Agusan del Sur	SPA	Gubas
Region 13	Surigao del Norte	Rizal, Socorro, Surigao del Norte	SPA	Mangkono
Region 13	Surigao del Sur	Puyat, Carmen, Surigao del Sur	IPTs	Malakawayan
Region 13	Dinagat Islands	San Jose, Dinagat Islands	IPTs	Agoho, Hambabalod

Appendix 3. Seed Collection Method, Extraction/Processing, Handling and Seed Count For Forest Plantation Species

Species	Collection Method	Seed Extraction/Processing	Seed Count/kg	Seed Type
Agoho	Climb the tree and handpick the fruit. Or use a bamboo pole with a scythe to pick the fruit.	Sun-dry the cones to release the seeds. Air-dry the seeds to reduce MC to 7-8%.	44,260/100g	Orthodox
Auri	Climb the tree and handpick the pods. Or clip the pods (after they turn dark brown or before they open) with pruning poles.	Sun-dry the pods; extract the seeds manually. Dry the seeds under the shade to reduce moisture content (MC) to 7%.	49,500/kg	Orthodox
Bagras	Climb the tree and handpick the fruit. Or use a bamboo pole with a scythe to cut the branches bearing the fruit.	Sun-dry the fruit on a double-layered, 1/8-inch mesh wire screen. The fruit would then dehisce. Rub the fruit slightly against a wire to get the seeds.	23 million/kg	Orthodox
Benguet pine	Climb the tree and handpick the cones. Or use a bamboo pole with scythe.	Sun-dry the cones and extract the seeds manually.	52,934/kg	Orthodox
Falcata	Collect the fruit/pod before the release of seeds, or when the pod turns light brown using a bamboo pole with a scythe.	Sun-dry the pods to release the seeds. Then air-dry the seeds up to 6-7% MC before storage.	15,000-22,000/kg	Orthodox
Giant ipil-ipil	Climb the tree and handpick the fruit. Or use a bamboo pole with scythe with scythe.	Sun-dry the pods to open and manually extract the seeds. Then dry the seeds in the shade until MC is 7-8%.	52,934/kg	Orthodox
Gubas	Use a bamboo pole with a scythe to cut the branches bearing the fruit.	Macerate the fruit in running water, or in basin to separate the seeds.	37,885/kg	Orthodox
Kaatoan-bangkal	Collect the fruit/seeds from the tree or from the ground.	Sun-dry the fruit so that the fleshy part can be removed manually or mechanically. Or soak the fruit in tap water until the seeds using a fine mesh strainer.	18-26 million/kg	Orthodox
Mahogany	Climb the tree and handpick the fruit. Or use a bamboo pole with a scythe.	Sun-dry the fruit to enhance the breaking up of capsules. Extract the seeds manually; remove the wings. Air-dry the seeds to reduce MC to 5-7%.	Medium size - 2,264/kg Small sized – 2,933/kg	Orthodox

Species	Collection Method	Seed Extraction/Processing	Seed Count/kg	Seed Type
Malapapaya	Climb the tree and handpick the fruit. Or use a bamboo with a scythe to cut the panicles bearing the fruit.	Soak the ripe fruit in tap water overnight. Then macerate the softened fruit on a wire mesh on top of a basin to get the small seeds. Separate the seeds that float. Clean the seeds that sink in running water thoroughly.	220,000/kg (newly extracted seeds)	Intermediate
Mangium	Climb the tree and handpick the fruit. Or clip the fruit from the tree with pruning poles when they change to dark brown and begin to crack open.	Sun-dry the pods; extract the seeds manually. Air-dry the seeds under the shade to reduce MC to 7%.	130,353/kg	Orthodox
Molave	Climb the tree and handpick the fruit. Or use a bamboo pole with a hook to get the fruit.	Macerate the ripe fruit to remove the fleshy pericarp. Then wash the seeds under running water. Dry the seeds under the shade until the MC is reduce to 8-10%.	8,594/kg	Orthodox
Narra	Limb the tree and handpick the pods. Or use a bamboo pole with scythe.	Sun-dry the fruit to make the capsule brittle. Extract the seeds manually.	1,794/kg	Orthodox
Raintree	Climb the tree and handpick the fruit. Or use a pole with scythe to pick the fruit. Collect newly fallen fruit from the ground.	Sun-dry the fruit/pods for 2-3 days. Extract the seeds manually in a screen mesh. Dry the seeds under the shade to attain 7-8% MC.	4,798/kg	Orthodox
Teak	Sweep the fruit or pick up the fruits as they fall. Or clip the fruit from the tree with pruning pole. Or shake the fruit from branches.	Remove the involucres by mechanically dehusking or by working a cloth bag half-filled with dried fruit against the ground with a foot and then winnowing to separate the fruit from the chaff.	880-3,070/kg	Orthodox
Yemane	Climb the tree and handpick the fruit. Or use a bamboo pole with a scythe to pick the fruit. Collect newly fallen fruit from the ground.	Soak the fruit in tap water for two days. Then macerate it under running water to clean the seeds. Air-dry the seeds to lower the MC to 7-8%.	1,995/kg	Orthodox

Appendix 4. Seed Testing of Forest Plantation Species

Species	Seed Germination		Seed Health Associated Microorganism	Control Measures	Seed Storage
	Pretreatments	Medium			
Agoho	None	Seeds directly sown in seedbeds or trays with sterilized 1:1:1 ratio of sand, topsoil and dried OM.	*Fusarium solani* *Lasiodiplodia theobromae* *Macropomina phaseolina* *Pestalotia sp.* *Aspergillus flavus* *A. niger* *Penicillium spp.* *Curvularia lunata*	Seed dressing using Benlate, Captan Anthracol and Bayletone at 2.5g ai/kg of seed using slurry method.	Store the seeds in tightly sealed plastic bag at 7-8^{0}C for 6 months.
Auri	• For new seeds, soak the seeds in tap water overnight. • For old and stored seeds (see mangium).	Sow the seeds on seed boxes or trays with sterilized potting medium to prevent damping oft	*F. solani* *Lasiodiplodia theobromae* *Colletotrichum gloeosporioides* *Macropomina phaseolina* *Aspergillus flavus* *A. niger*	Soaking the pretreated seeds in fungicidal solution for 5 hours or seed dressing using Benlate Captan and Anthracol.	Store the seeds in sealed plastic bag at 7^{0}C with 7-8% MC for 2-3 years.
Bagras	None	Sow the seeds in seed boxes or trays with sterilized potting medium preferably sandy loam soil.	*Pestalotia sp.* *Aspergillus flavus* *A. niger* *Curvularia lunata*	Soak the seeds in fungicide solution of Benlate, Captan and DM-45 for 5 hours.	Store seeds in tightly sealed plastic bag at 4^{0}C or below.
Benguet pine	None	Sow the seeds in plastic trays with paper towel or sown in seedbed with fine sand.	*F. solani* *F. moniliforme* *C. lunata* *A. niger*	Seed dressing with either of the following fungicides; Captan, Benlate, Daconil, DM-45 at 2.5g ai/kg of seeds.	Store the seeds in sealed plastic bag at 7-8^{0}C with 7-10% MC for 2 years.

Species	Seed Germination		Seed Health Associated Microorganism	Control Measures	Seed Storage
	Pretreatments	Medium			
Falcata	Soak the seeds in boiling water for 3 minutes then soak in tap water overnight.	Sow the seeds in plastic tray with 1:1:1 ratio of soil, sand and dried OM.	*F. moniliforme* *Aspergillus spp.* *Penicillium spp.*	Soak the pretreated seeds in 0.02% fungicidal solution of Daconil, Captan or Benlate overnight.	Place the seeds in plastic bag sealed tightly and store at 7^0C with 8% MC.
Giant ipil-ipil	• Soak the seeds in concentrated H_2SO_4 for 20-30 minutes and soak in tap water overnight. • Soak the seeds in boiling water until the water turns cold for 24 hours.	• Sow the seeds in tray with paper towel or in seedbed with fine sand. • Or sown directly from 4"x6" plastic bag with 1:1:1 ratio of sand topsoil or organic matter.	*F. moniliforme* *F. solani* *C. gloeosporoides* *C. truncatum* *C. falcata* *Aspergillus flavus* *Penicillium spp.* Associated insect *Araecerus fasciculatus*	Coat the pretreated seeds with Delsene MX, Benlate and Daconil.	Store the dried seeds with 7% MC in sealed plastic bag at 7^0C for 4 years.
Gubas	Soak the seeds in tap water overnight.	Sow the seeds in seed boxes.	No study conducted	As a control measures against pre emergence: damping off, coat the seeds with fungicide before sowing.	Store the seed in air tight container and store in the dark with 7^0C temperature.
Kaatoan bangkal	None	Seeds sown in garden soil in seed boxes under the shade. Seeds covered thinly with fine soil.	No study conducted	No study conducted	Store the seeds in airtight container in a dark room
Mahogany	Remove the wings	• Sow the seeds directly in	*Phomopsis* *Lasiodiplodia theobromae*	Coat the seeds with either Benlate,	Store the seeds in tightly sealed

Species	Seed Germination		Seed Health Associated Microorganism	Control Measures	Seed Storage
	Pretreatments	Medium			
		4"x6" plastic bag with 1:1:1 ratio of sand, OGS and dried OM. • Sow the seeds in trays with the same potting medium.	*Fusarium solani* *Aspergillus flavus* *A. niger* *Pestalotia* *F. moniliforme* *Penicillium spp.* *F. equiseti*	Capton or Dithane M-45 at 2.5 ai/kg of seeds or soak the seeds with the solution of these fungicide.	bag and place at 7^0C with 7% MC.
Malapapaya	Pretreatments not required however, alternate sun-drying and wetting of seeds hasten the seed germination.	Sow the seeds in sterilized potting medium with 1:1:1 ratio of sand, dried organic matter and topsoil.	*Fusarium solani* (Agorata, 1979) Pests and diseases root observed on seeds (Dayan and Reaviles, 2004)	-none-	Place the wet seeds in calico bag, wrap with newspaper and store the seeds in dark place.
Mangium	• For new seeds soak in tap water overnight. • For stored and old seeds, soak the seeds in boiling water until the water turns cold overnight or soak the seeds in boiling water for 3 to 4 minutes and soak in tap water overnight.	• Fine sand in trays • Paper towel in plastic trays • Sow the pretreated seeds in sterilized 1:1:1 ratio of sand, tap soil and dried OM.	*Pestalotia sp.* *Aspergillus spp.* *Penicillium spp.* *Fusarium solani* *F. moniliforme*	Soak the pretreated seeds in fungicide solution (Benlate, Daconil and Dithane M-45 for 5 hours.	Place the seeds in tightly sealed plastic bag and store at 7^0C with 7%-8% MC.

Species	Seed Germination		Seed Health Associated Microorganism	Control Measures	Seed Storage
	Pretreatments	Medium			
Molave	Alternate wet and sundrying for 6 days.	Sow the seeds in potting medium with 1:1:1 ratio of sand, topsoil and dried OM.	*Aspergillus spp.* *Penicillium spp.*	Soak the seeds in fungicide solution overnight.	Place the seeds in tight container or plastic bag and store in 7-8% MC.
Narra	• Trim the wings of the pod and soak in fungicide solution or in tap water overnight for large volume of seeds. • Sundry to make the pod brittle, extract the seeds from the pod and soak the extracted seeds in tap water overnight.	• Sow the pods directly in seed bed, cover the pod with topsoil. • Sow the extracted seeds in plastic tray with paper towel or in tray with 1:1:1 ratio of sand, topsoil and dried OM.	*F. solani* *C. gloesporioide* *Phomopsis sp.* *A. flavus* *Penicillium spp.* *F. moniliforme*	Soak the seeds in fungicide solution of Benlate, Ditane M-45, or Captan for 5 hours or coat the extracted seeds with fungicide using slurry method.	Sun-dried pods can be place in sacks or in big plastic bags and store at room temperature and refrigerator, respectively.
Raintree	• For newly collected and extracted seeds, soak the seeds in tap water overnight. • For old and stored seeds, soak the seeds in concentrated sulfuric acid for 30 minutes and soak in tap water overnight.	Sow the pretreated seeds in seed bed or in trays with 1:1:1 ratio of soil, sand and dried OM.	*F. solani* *A. niger* *A. flavus* *Penicillium spp.*	Soak the pretreated seeds in fungicide solution of DM-45, Captan and Benlate for 5 hours.	Place the seeds in tightly sealed plastic bag and store the seeds at 8-15^{0}C with 7-8% MC.

Species	Seed Germination		Seed Health Associated Microorganism	Control Measures	Seed Storage
	Pretreatments	Medium			
Teak	Remove the velvety pericarp and alternately wet and sundry seeds for 3-5 days.	• Sow the seeds in seed bed or on trays with 1:1:1 ratio of topsoil, dried organic matter and sand. • Tray with 3 layers of paper towel.	No report of associated microorganism and pests.	No report	Remove the papery brown covering the fruit and place the fruit in tightly sealed plastic bag, and store at room temperature or in 7^0C inside the refrigerator.
Yemane	Soak the seeds in tap water overnight.	Sow the seeds in plastic trays or seed boxes with fine sand or sow the seeds directly in 4"x6" plastic bag with 1:1:1 ratio of sand, top soil and dried organic matter.	*Lasiodiplodia theobromae* *A. niger* *A. flavus* *Penicillium spp.*	Soak the seeds in 0.02% fungicidal solution of Benlate, or Captan and DM-45 or coat the seeds using the same fungicide at 2.5g ai/kg of seeds.	Place the seeds in plastic bag close tightly and store at 7^0C with 7-8% MC.

Appendix 5. Seed Register Book

Date	Species	Provenance	Field Number	Weight (g)	Seedlot Number

Appendix 6. Consignment Note for Seed Certification

Consignee: _____

_____

_____

Seedlot No.	Species	No. of parent trees	Weight (kg)	Locality	Zone	Latitude (N)	Longitude (E)	Elevation (masl)	Viability (kg)	Pre-Treatment

Prepared by:

_____
Signature over Printed Name

Date: _____

Attested by:

_____
Research Center Head/FTSC Manager
(Signature over Printed Name)

Appendix 7. MC 2021-09

Department of Environment and Natural Resources
Ecosystems Research and Development Bureau

NOV 0 3 2021

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.

HENRY A. ADORNADO, *Ph.D.*
Director

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Appendix 8. MC 2021-10

Department of Environment and Natural Resources
Ecosystems Research and Development Bureau

ERDB MEMORANDUM CIRCULAR
No. 2021 - 10

SUBJECT : ADOPTION OF THE GUIDELINES IN THE MANUAL ON THE SEED LABORATORY OPERATIONS OF THE ECOSYSTEMS RESEARCH AND DEVELOPMENT BUREAU (ERDB)

In the interest of the service and in line with the ERDB's effort to provide quality and reliable laboratory test results in support to the different Research, Development and Extension Programs, Projects, and Activities (RDE PPAs), the guidelines stipulated in the Manual on the Seed Laboratory Operations are hereby adopted for the information and guidance of all concerned.

The Manual on the Seed Laboratory Operations contains the entire laboratory services provided such as seed testing of different tree species specifically the viability test, and the seed health test. These include the seed collection, seed count, and Moisture Content (MC) determination. The seed processing and testing activities are very essential to ensure the quality of the seeds collected prior to germination and planting.

The Laboratory and Experimental Services Division (LESD) of ERDB shall periodically review this manual for updating of Standard Operating Procedures (SOPs) according to the availability of equipment and processes based on the generally accepted standards for laboratories.

This Memorandum Circular takes effect immediately.

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SUPPLEMENTAL ANNEXES

Supplemental Annex 1. Field Data Sheet

Ecosystems Research and Development Bureau

Seed Unit – Seed Label

Field Number:	
Species	
Common Name:	
Scientific Name:	
Provenance:	
Date of	
Collection:	
Collected by:	
Remarks:	

Copy 2

Ecosystems Research and Development Bureau

Seed Unit – Seed Label

Field Number:	
Species	
Common Name:	
Scientific Name:	
Provenance:	
Date of	
Collection:	
Collected by:	
Remarks:	

Copy 1

Supplemental Annex 2. Fruit Collection Advice Note

Seedlot No.: _____

To: Seed Unit

From: Collection Team Leader:

The fruits/seeds collected below were collected and delivered to the seed unit.

Species: _____
Quantity: _____
Signed: _____
Date: _____

Collection Details:
Species: _____ Field Numbers: _____
Date of
Collection: _____
Number of trees collected
from: _____
Remarks: (collection method, number of bags collected, etc.)
_____
_____
_____

Supplemental Annex 3. Seed Extraction Note

For Use by Extraction Staff

Date Received: _____ No. of bags/containers received: ____ Weight (kg): _____

Seedlot No. _____

Seed extraction and cleaning method: _____

Quantity/weight of seeds after extraction/cleaning: _____

Name: _____

Designation: _____

Signature:

For Use by Seed Store/Seed Bank

Seedlot: _____

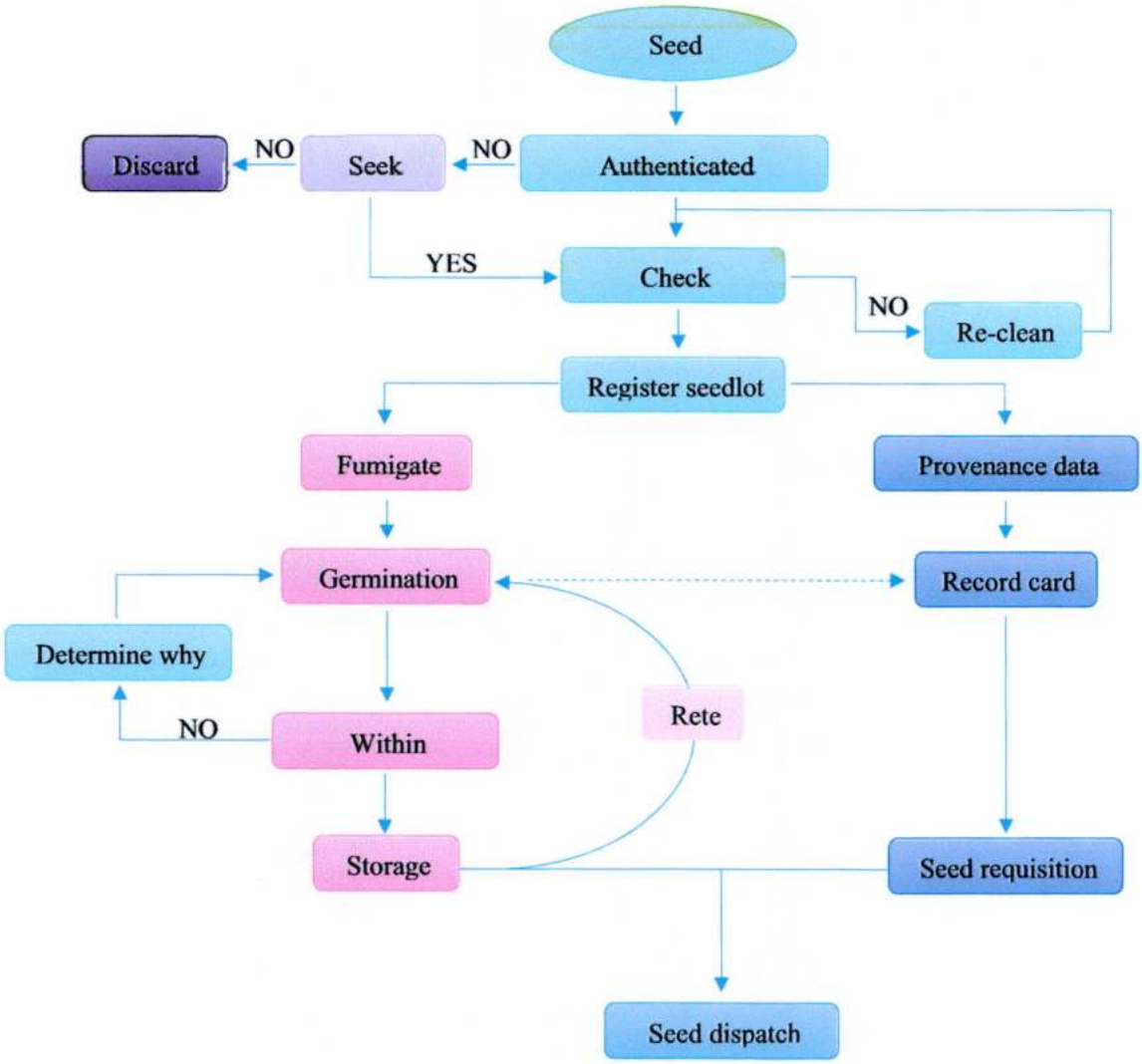
Date Received: _____ Weight (kg or g): _____

Name: _____

Designation: _____

Signature:

Supplemental Annex 4. Seed Flow



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