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SELECTING THE APPROPRIATE MOTHER TREE OF TIMBER SPECIES

Seedling quality

1. *Physical Quality*
   - reflective of the nursery silvicultural treatments
2. *Genetic Quality*
   - based on the genetic make-up of the mother tree

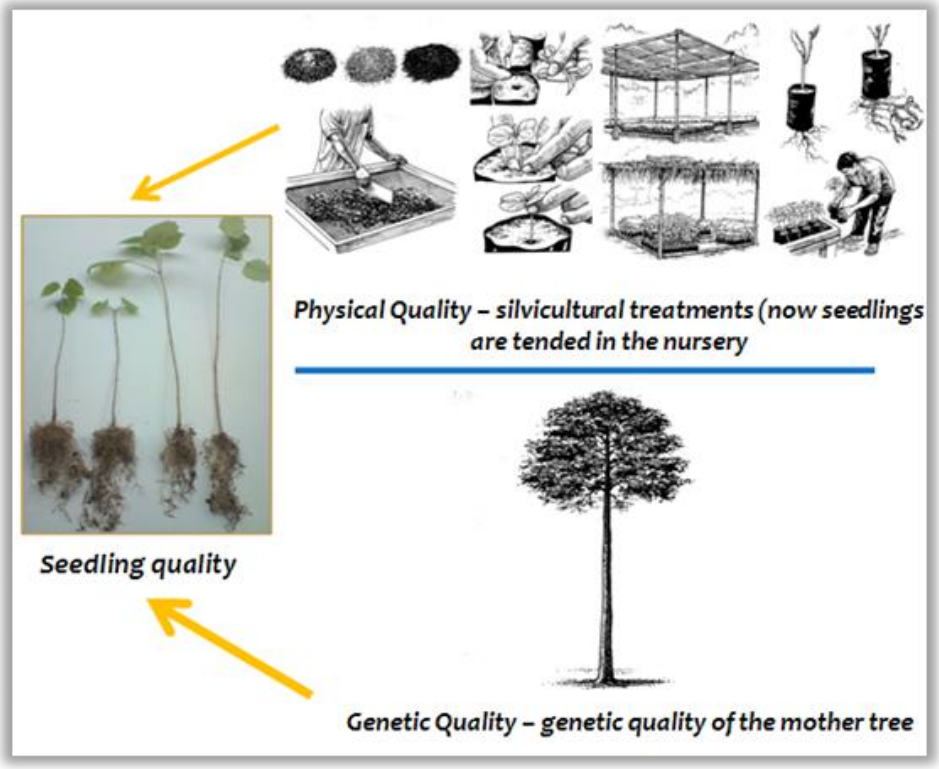


Figure 1. Main factor shaping-up seedling quality

Genetic quality

1. *Genotypic Characteristic* — cannot be seen readily; total genetic inheritance

2. *Phenotypic Characteristic* — observable characteristics of an organism (including size, shape and color); interaction of genotype to the environment

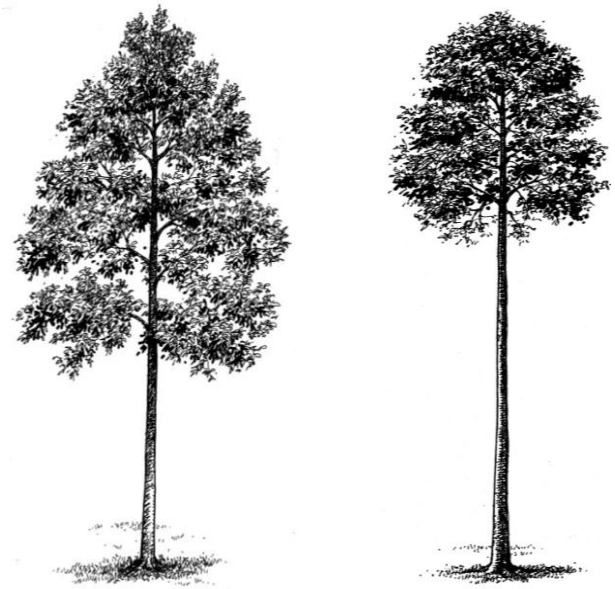


Figure 2. Illustration of ideal mother tree for timber species

Seed sources

1. *Seed sources* — refer to individual trees or stands from which seeds are collected

- **Seed orchard**– stands established for the specific purpose of seed production. Consist of families of superior genetic quality and planted at a regular spacing and specific design

  a. Should be established at least of 30 families from seed orchard

  b. 2-3 thinning of poor trees will be done

  c. Isolation should be done to maintain the quality of seeds produced

Figure 3. Illustration of ideal mother tree for timber species

- **Seed Production Areas** — stands of trees either in natural forest or plantations that are improved for the specific purpose of seed production

  a. Improvement consists of selective thinning to achieve optimal spacing for seed production and to remove poor quality trees, including those that have been attacked by pests and diseases

  b. Thinning should be done so that the superior trees retained are evenly spaced

  c. Should be isolated from the contamination of pollen from undesirable stand of the same species

  d. As general rule, seed orchards and SPAs are isolated by a distance of at least 200m

Figure 4. A seed production area

- **Seed stands** — are groups of trees either in natural forests or plantations, identified as having superior characteristics such as straight stem form or rapid growth

  a. Managed for seed production but seldom benefit from selective thinning or other management intended to improve the quality of seeds produced from the stand

Figure 5. Examples of seed stands

- **Seed trees** — are individual trees from which seed is collected, either in natural forest or tree plantations; most common source of germplasm for smallholder forestry

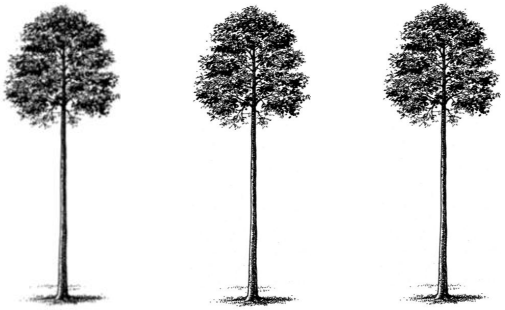


Figure 6. Illustration of seed trees

Table 1. Characteristics of several seed sources

CHARACTER	SEED SOURCE			
	Seed Orchard	***Seed Production Area***	***Seed Stand***	***Seed Trees***
Planting Purpose	Seed Production	Not for Seed Production	Not for Seed Production	Not for Seed Production
Seed Origin	Identified	Identified and Unidentified	Unidentified	Unidentified
Quality of Mother Trees	Selected and Tested Trees	Selected Stands, Thinned, Untested	Selected Stands, Unthinned (or Thinned) Untested	Selected Trees from Unselected Stands
Seed Quality	Very Good	Good	Fairly Good	Intermediate
Level of Management	Very Intensive	Intensive	Intermediate	Some

Adopted from Mulawarman et. al. (2001)

COMMON PRACTICE

1. Germplasm used in smallholder seedling production is taken from unselected mother trees; collected without the conscious selection of seed sources

2. Germplasm from poor trees will result to poor plantations

Figure 7. Common seed sources of nursery operators

3. *Poor stem form commands low price*

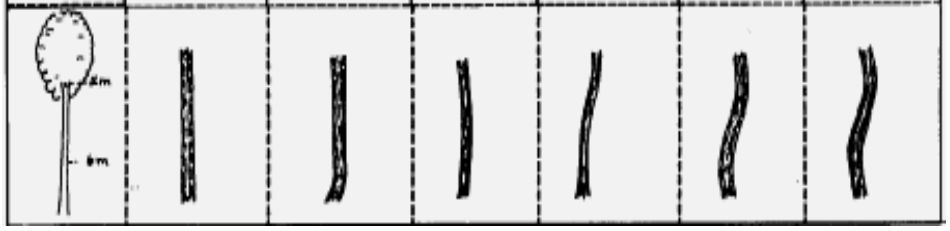
Figure 8. Quality of timber and waste due to undesirable stem form

Figure 9. Desirable stem form of trees in a plantation

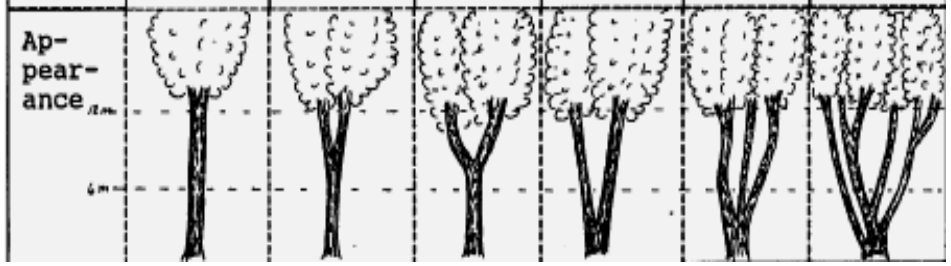
Assessment of the phenotypic characteristics of mother trees

CRITERION	PARAMETER
Stem Growth	Total Height (m)
	Diameter at Breast Height (cm)
Stem Form	Stem Straightness
	Forking/Stem Branching
	Circularity of the Stem
Health	Tree Health
Branching Characteristics	Branch Angle
	Branch Thickness
	Branch Persistence

⦿ Stem Straightness

Class	Straight		Fair		Unacceptable	
Grade	6	5	4	3	2	1
						

⦿ Forking/Stem Branching

Class	Good		Fair		Unacceptable	
Grade	6	5	4	3	2	1
Ap-pear-ance						

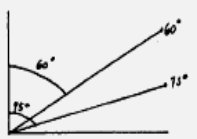
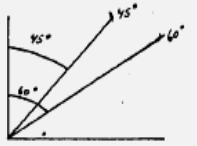
⦿ Stem Circularity

Class	Good		Fair		Unacceptable	
Grade	6	5	4	3	2	1
Cross sec-						

■ Tree Health

Class	Good		Fair		Unacceptable	
Grade	6	5	4	3	2	1
Note	Green-lush vigouros crown		Intermediate		Thin yellow crown	

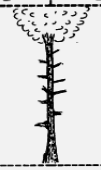
■ Branch Angle

Class	Good		Fair		Unacceptable	
Grade	6	5	4	3	2	1
						
Note	90° - 75°		75° - 60°		60° - 45°	

■ Branch Thickness

Class	Good		Fair		Unacceptable	
Grade	6	5	4	3	2	1
						
Note	Thin branches rel. to tree size		Intermediate		Thick coarse branches rel. to tree size	

■ Branch Persistence

Class	Good		Fair		Unacceptable	
Grade	6	5	4	3	2	1
Appe-aran-ce						
Note	Dry branches shed rel. fast after canopy closure		Intermediate		Dry branches remain on the stem for several years after canopy closure	

Phenotypic quality grade

- Mean score of points for all criteria

GRADING SCALE	
1 - 2	Unacceptable
3 - 4	Fair
5 - 6	Good

- Tally Sheet

CRITERION	POINTS
Stem Straightness	
Stem Branching	
Stem Circularity	
Health	
Branch Angle	
Branch Thickness	
Branch Persistence	
Mean Score	

- Example

PARAMETER	SCORE
Stem Straightness	5
Stem Branching	4
Stem Circularity	3
Health	6
Branch Angle	5
Branch Thickness	4
Branch Pruning	5
Mean Score	4.6 ≈ 5 = Good

- Materials
  1. Tally Sheet
  2. Pencil
  3. Diameter Tape
  4. Hypsometer
  5. Spray Paint
  6. Bolo

INVENTORY OF MOTHER TREES

Plot No:_____ Location:_____ GPS Coordinates: Easting _____ Northing_____
Azimuth_____ HD from Tie Point _____ Assessor's Name: _____ Date: _____

Tree no.	Local Name	Common Name	Azimuth	HD (m)	Phenology	TH (m)	MH (m)	DBH (cm)	Stem Straightness	Stem Branching	Stem Circularity	Tree Health	Branch thickness	Branch persistence
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
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22														
23														
24														
25														

Grading scale: 1-2 (Unacceptable) 2-3 (Fair) 4-5 (Good)
Phenology code: A (Flowering); B1 (Fruiting Young), B2 (Fruiting Mature)

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TREE IDENTIFIER NOTES

Name of Tree ID expert: _____

Plot No.	Remarks
1	
2	
3	
4	
5	
6	
7	
8	

Selecting the Appropriate Mother Tree of Timber Species

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