Seed Propagation Protocol Form

BOTANIC GARDENS CONSERVATION INTERNATIONAL

SEED PROPAGATION PROTOCOL

This form collates the information about the best method for seed propagation and growing up of the target species.

Authorship *(people that contributed propagation information)*: Tanzania Forest Service Agency

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Logo/s of the affiliated organisation(s):

This propagation protocol is subject to change and updates when new information on the propagation of the species becomes available. If there any comments or changes you would like to make, please send the information to africa@bgci.org

GENERAL INFORMATION					
Taxon name	*Scientific name of the propagated species*	*Markhamia lutea*	**Name/s of propagator/**	*Name(s) of the person or people that carried out the propagation*	
Family	*Plant family of the propagated species*	Bignoniaceae	**Organisation**	*Organisation(s) where the propagation was carried out*	**TFS**
Origin of seeds	*Site(s) and country where seeds were collected*	Morogoro, Lindi and Kilimanjaro region	**Site and country**	*Site(s) and country where the propagation took place*	Kigoma, Tabora, Kilimanjaro, Morogoro, Mtwara and Lindi

SEED DESCRIPTION & PROCESSING		
Description of the seeds and the processing of the seeds before seed sowing.		
Time of year for seed collection	*List month/s of the year when seed collection is best*	• June to September • Occasionally, December to February (depending on rainfall pattern)
Fruit/seed transport	*Describe how fruit/seeds have been stored during transport from the field to the nursery*	• Collecting mature unopened capsules directly from the tree or freshly fallen ones. • Wrapping fruits in well-ventilated cloth or woven paper bags. • Keeping in a cool, shaded place during transport. • Transporting to nursery as soon as possible (preferably within 1–2 days).

		• Avoid crushing of capsules to prevent seed damage.
Processing of fruits/seeds	*Describe how the fruits/seeds are processed in situ or in the nursery (seed extraction methods, seed cleaning, handling of fruits/seeds...)*	• Spreading capsules on a clean tarpaulin and allow drying (2-5 days) under the sun • Dried opened capsules are shaken to release the seeds • Purification is done to remove debris and damaged seeds • Handle gently since seeds are lightweight and delicate About 16kg of fruits produce 1kg of seeds.
Method to assess seed viability	*Describe method used to estimate seed viability (e.g. floating test, cut test, tetrazolium test, X-ray test)*	1. **Cut test:** • Cut seeds longitudinally. • Viable seeds have firm, white/cream embryos. • Empty or darkened seeds are non-viable. 2. **Floating test:** • Place seeds in clean water. • Viable seeds often sink; empty seeds float. *(Note: Less reliable due to winged structure.)* 3. **Tetrazolium test (more accurate):** • Seeds soaked and treated with tetrazolium red solution. • Living tissues stain red. NB: The cut test is most practical in nurseries.
% Estimated seed viability	*(Number of viable seeds) x 100 / (Total number of seed for which viability was estimated)*	Formula: Seed viability(%)= (number of viable seeds÷Total seeds tested)× 100 Example: If 85 viable seeds out of 100 tested: (85÷100)×100= 85% Typical viability: **60–85%** depending on handling and storage.
Type of seed	*Choose one of these options: Orthodox, Intermediate, Recalcitrant or Unknown*	**Orthodox** • Seeds tolerate drying. • Can be stored at low moisture (5–10%).and temperature 3°C
Seed size	*Include a measuring unit*	• Length: 2–3 cm (including wings)

	(e.g. mm, cm…)	• Seed body (without wings): 5–8 mm
Number of seeds per gram	*Count a reasonable number of seeds and weigh them. Then, divide the number of seeds by their weight (e.g. 100 seeds / 5 g = 20 seeds/g)*	Approximately 7500 seeds per gram
Seed storage	*If seeds have been stored before germination, mention storage facilities (seed bank, fridge, freezer), and describe conditions (humidity, temperature), type of container, and storage time length.*	Storing before germination: • **Container:** Airtight container, paper envelope inside sealed jar • **Temperature:** 4–10°C (refrigerator) • **Relative humidity:** Below 50% • **Storage facility:** Refrigerator or seed bank • **Storage duration:** 6 months to 1 year (best viability within 6 months) Ensure seeds are properly dried before storage (moisture content about 8–10%).

+ ***Add photographs of the fruit and seeds. Make sure to include a detailed description of the photo, such as the growth stage, date, activity or process.***

SEED PROPAGATION PROTOCOL

GERMINATION			
Description of procedures, materials for seed germination and the germination success.			
Procedures	**Seed treatment**	*Describe treatment applied to the seed before sowing (e.g. mechanical scarification, chemical scarification, soaking, stratification, smoke treatment…). If applied, include the duration of the treatment.*	No seed treatment required. Optional: Soak in clean water for 6–12 hours before sowing to enhance uniform germination.

	Seed sowing media	*Media composition: include percentages/ratio for the different components*	Recommended mixture: TSPS-Morogoro • Top Black Forest soil – 63% (5) • Well decomposed Manure – 25% (2) • Rice husk – 12% (1) **Ratio is 5:2:1** Well-drained and sterilized, if possible, for Nursery conditions For Laboratory conditions; the use of sand is preferable.
	Container	*Describe size and material of the container in which seeds are sown*	Seed trays (plastic) and Black polyethylene bags of height 8–10 cm and diameter 101.4 mm or 4``
	Seed spacing	*Describe the recommended spacing between the seeds when sown. Include a measuring unit (e.g. mm, cm…)*	2-3 cm between seeds in trays
	Seed depth	*Describe how deep the seeds are sown. Include a measuring unit (e.g. mm, cm…)*	Lightly covered with 0.5–1 cm of fine sand/soil (Seeds should not be deeply buried.)
	Watering technique	*Describe watering tool, technique and frequency during sowing and germination*	• Tool: Fine rose watering can • Frequency: Once daily (morning) or as needed • Keep medium moist but not wet.
	Germination facilities	*Describe the facilities where the germination of seeds took place (e.g. close case, outdoor shaded area, heated bench, covered/bagged container...)*	• Shaded nursery area (50% shade net) • Raised germination bench
	Environmental conditions	*Describe the environmental conditions where germination took place (temperature, humidity, and photoperiod)*	• Temperature: 20–30°C • Relative Humidity: 60–80% • Light: Partial shade

Success	**Time of year for seed germination**	*List month/s of the year when seed germination is best*	October, November and December
	Duration until germination	*Average number of days/months/years until seeds germinated*	7–21 days after sowing
	% Germination success	*(Number of seeds germinated) x 100 / (Total number of seeds sowed)*	Germination is fair to uniform. It reaches 35 after 15 days and 50% after 20 days from sowing day.
Materials		*List the materials needed for seed germination to help with the planning of this activity. E.g. trays, sieves, dibbers, labels, ruler…*	• Seed trays/ Black polyethylene bags • Sieves • Fine sand • manure • Watering can • Labels and marker • Ruler • Tarpaulin

+ ***Add photographs of the germination process. Make sure to include a detailed description of the photo, such as the growth stage, date, activity or process.***

SEED PROPAGATION PROTOCOL

FIRST POTTING			
Description of procedures and materials for the cultivation of the plants and the success of the growing of the plants.			
Procedures	**Growing Media**	*Media composition: include percentages/ratio for the different components*	Recommended mixture: TSPS • Black Forest soil – 63% • Rice husk – 12% • Well decomposed Manure – 25% Well-drained and sterilized if possible.
	Container	*Describe size and material of the container in which plants are potted*	Black polyethylene bags of height 8–10 cm and diameter 101.4 mm or 4”
	Fertiliser	*If used, include: type (organic or inorganic); nutrient composition and its ratio; and application (added to soil, dissolved on water, foliar application)*	Type: Organic preferred • Well-decomposed manure mixed in media OR • NPK (e.g., 10:10:10) at low rate Application: Mixed into soil or light top-dressing after establishment.
	Watering technique	*Describe watering tool, technique and frequency while growing the plants*	• Watering can or hose with fine nozzle • 2–3 times per week depending on weather • Avoid overwatering
	Plant growing facilities	*Describe the facilities where the plant growing took place (e.g. glasshouse, outdoors, shaded area...)*	• Outdoor nursery under shade net (initial stage) • Later hardened in full sunlight
	Environmental conditions	*Describe the environmental conditions where the plant growing took place (temperature, humidity, light levels)*	• Temperature: 20–30°C • Good sunlight after 4–6 weeks • Moderate humidity
Success	**Number of days until first potting**	*Average number of days since the start of seeds sowing until first potting*	21–30 days after sowing (When seedlings have 2–3 true leaves)

	Duration until established plants	*Average number of days/month/years for which the plant growth was monitored until the establishment of plants*	4–6 months in nursery before field planting
	% Plants established	*(Number of plants established) x 100 / (Total number of plants potted)*	Example: 70÷ 80×100=87.5% Typical: **70–90% establishment**
	Health observations	*Record any signs of pest or disease, nutrient deficiency, damage… and the stage when they were observed (e.g. during germination, growing of seedlings, growing of plants….)*	• Damping-off (during germination if overwatered) • Aphids (seedling stage) • Yellowing leaves (nitrogen deficiency) Can be prevented with proper drainage and sanitation.
Materials		*List material needed for potting to help with the planning of this activity. E.g. pots, dibbers, labels…*	• Poly pots (10 × 20 cm) • Potting mix • Dibber • Labels • Watering can

+ ***Add photographs of the pricking out, potting, and the growing of plants. Make sure to include a detailed description of the photo, such as the growth stage, date, activity or process.***
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