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*	*Entandrophragma excelsum*	**Name/s of propagator/**	*Name(s) of the person or people that carried out the propagation*	
Family	*Plant family of the propagated species*	Meliceae	**Organisation**	*Organisation(s) where the propagation was carried out*	
Origin of seeds	*Site(s) and country where seeds were collected*	Afromontane forest, Kilimanjaro Region	**Site and country**	*Site(s) and country where the propagation took place*	Kilimanjaro Region

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*	September–November
Fruit/seed transport	*Describe how fruit/seeds have been stored during transport from the field to the nursery*	• Fruits are collected from tree or freshly fallen. • Transported in well-ventilated sacks (sisal/mesh bags). • Kept dry and shaded. • Avoid plastic bags to prevent overheating and fungal growth.
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…)*	• Capsules dried complete in the sun for 3–5 days until fully split. • Seeds manually extracted. • Wings may be trimmed before sowing. • Debris removed by hand sorting or sieving. • Damaged seeds discarded. About 10kg of fruits produce 1 kg 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 red test (more accurate):** • Seeds soaked and treated with Tetrazolium red solution. • Living tissues stain red
% Estimated seed viability	*(Number of viable seeds) x 100 / (Total number of seed for which viability was estimated)*	• Typically 50–75%**,** depending on collection timing and storage
Type of seed	*Choose one of these options: Orthodox, Intermediate, Recalcitrant or Unknown*	Seeds are intermediate between orthodox and recalcitrant
Seed size	*Include a measuring unit (e.g. mm, cm…)*	• Length: 2.5cm • Width: 1.5cm
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)*	There about 1200 winged seeds per kilogram
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.*	• Stored in airtight containers. • Temperature: 4–10°C (refrigerator). • Moisture content: 5–8%. • Storage duration: Up to 6–12 months under cool, dry conditions.

\+ ***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 pretreatment is required, but the wings should be broken off
	Seed sowing media	*Media composition: include percentages/ratio for the different components*	Recommended mixture: Tree Seeds Production Station -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
	Container	*Describe size and material of the container in which seeds are sown*	• Germination trays or raised nursery beds. • Pricked out into polythene tubes (10–15 cm diameter; 20–25 cm height).
	Seed spacing	*Describe the recommended spacing between the seeds when sown. Include a measuring unit (e.g. mm, cm…)*	3–5 cm apart in seedbeds.
	Seed depth	*Describe how deep the seeds are sown. Include a measuring unit (e.g. mm, cm…)*	• Sown at 1–2 cm depth. • Cover lightly with fine sand.
	Watering technique	*Describe watering tool, technique and frequency during sowing and germination*	• Fine rose watering can or mist sprayer. • Water twice daily (morning and evening). • Avoid waterlogging.
	Germination facilities	*Describe the facilities where the germination of seeds took place (e.g. close case, outdoor shaded area, heated bench, covered/bagged container…)*	• Outdoor nursery under 50% shade net. • Raised beds with good drainage.
	Environmental conditions	*Describe the environmental conditions where germination took place (temperature, humidity, and photoperiod)*	• Temperature: **18–28°C** (cooler highland conditions preferred). • Humidity: 60–80%. • Light: Partial shade. • Photoperiod: Natural daylight (approx. 12 hours in East Africa).
Success	**Time of year for seed germination**	*List month/s of the year when seed germination is best*	1. **Northern & Eastern Zone** • October – December • March – May 2. **Central Zone** • November – April • May – October
	Duration until germination	*Average number of days/months/years until seeds germinated*	14–40 days after sowing.
	% Germination success	*(Number of seeds germinated) x 100 / (Total number of seeds sowed)*	Germination is very good and uniform. It attains 30% after four weeks and 80% after six weeks of sowing
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 • Potting media • Hot water container • Watering can • Labels and marker • Shade net • Ruler

+ ***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: Tree Seed Production Station-Morogoro • Top Black Forest soil – 63% (5) • Well decomposed Manure – 25% (2) • Rice husk – 12% (1) **Ratio is 5:2:1**
	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)*	• Organic compost incorporated in potting mix. • Optional: NPK (20:10:10) applied lightly after 4–6 weeks. • Application: Dissolved in water and applied to soil (not foliar at early stage).
	Watering technique	*Describe watering tool, technique and frequency while growing the plants*	• Fine rose watering can. • Once daily; adjust according to rainfall and temperature. • Reduce frequency during hardening.
	Plant growing facilities	*Describe the facilities where the plant growing took place (e.g. glasshouse, outdoors, shaded area...)*	• Outdoor nursery under 30–50% shade. • Gradual exposure to full sunlight before transplanting.
	Environmental conditions	*Describe the environmental conditions where the plant growing took place (temperature, humidity, light levels)*	• Temperature: 18–30°C • Moderate humidity • Good airflow • Gradual increase in light intensity during hardening off.
Success	**Number of days until first potting**	*Average number of days since the start of seeds sowing until first potting*	60 days after germination (2–3 true leaves stage).
	Duration until established plants	*Average number of days/month/years for which the plant growth was monitored until the establishment of plants*	5–8 months in nursery before field planting.
	% Plants established	*(Number of plants established) x 100 / (Total number of plants potted)*	Typically 65–85% survival after potting and hardening.

	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 (fungal disease) during germination. • Leaf miners and caterpillars at seedling stage. • Yellowing (nitrogen deficiency) in poor soils. • Root deformation if containers are too small.
Materials		*List material needed for potting to help with the planning of this activity. E.g. pots, dibbers, labels…*	• Polythene tubes • Potting mix • Dibber • Watering can • Labels • Shade net

+ ***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.***