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*	*Sclerocarya birrea*	**Name/s of propagator/**	*Name(s) of the person or people that carried out the propagation*	
Family	*Plant family of the propagated species*	Anacardiaceae	**Organisation**	*Organisation(s) where the propagation was carried out*	
Origin of seeds	*Site(s) and country where seeds were collected*	Morogoro, Tanga, Bagamoyo, and Lindi	**Site and country**	*Site(s) and country where the propagation took place*	Morogoro, Tanga, Bagamoyo, and Lindi-Tanzania

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*	January – April
Fruit/seed transport	*Describe how fruit/seeds have been stored during transport from the field to the nursery*	• Collect freshly fallen ripe fruits. • Transport in well-ventilated crates or woven sacks. • Avoid stacking deeply (to prevent fermentation). • Keep under shade and process within 2–3 days.
Processing of fruits/seeds	*Describe how the fruits/seeds are processed*	**For small quantity** • fruit skin and pulp are removed with a knife

	in situ or in the nursery (seed extraction methods, seed cleaning, handling of fruits/seeds...)	• stones are washed in water • stones are dried in the sun for at least two days **For bulk quantities** • Fruits are soaked in water for one day • Then mixed with gravel in proportional by weight of one part gravel to two parts fruits • Together with large volume of water, the mixture are poured into a concrete mixture and stirred for twenty minutes • Water, pulp and skin are poured off, leaving the seeds and gravel • The gravel are picked out by hand **Another method** • Fruits are soaked in water for one day • Then pounded them in a mortar with a wooden pestle, add some course sand to facilitate the process • The seeds, skin and pulp are mixed with large quantities of water in a bucket and stirred well • The skin, pulp and water are then poured off After extraction, stones should be dried in the sun for at least two days about 5 kg of fruits produce 1 kg of stones
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)*	Typical viability: 50–80% (varies widely).
Type of seed	*Choose one of these options: Orthodox, Intermediate, Recalcitrant or Unknown*	Orthodox
Seed size	*Include a measuring unit (e.g. mm, cm…)*	• Fruit: 3–4 cm diameter • Stone (endocarp): 2–3 cm long • Kernel inside: approx. 1–1.5 cm
Number of seeds per gram	*Count a reasonable number of seeds and weigh them. Then, divide*	Approximately 500 stones per gram

	the number of seeds by their weight (e.g. 100 seeds / 5 g = 20 seeds/g)	
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.*	• Storage facility: Seed bank**,** • Temperature: 25^0C • Humidity: Low (12-14% moisture content) • Container Storage duration: Up to 2–4 years under proper 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.***

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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.*	The windows should be removed with a small chisel. Complete remove of the kernels is not recommended because of their fragility. The seed coat is very thin and does not delay germination
	Seed sowing 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** Well-drained and sterilized if possible.
	Container	*Describe size and material of the container in which seeds are sown*	• Seed trays or germination beds. • Polythene tubes: 15–20 cm height × 8–10 cm diameter**.**
	Seed spacing	*Describe the recommended spacing between the seeds when sown. Include a measuring unit (e.g. mm, cm…)*	• In seedbeds: 10–15 cm apart. • One seed per pot recommended.
	Seed depth	*Describe how deep the seeds are sown. Include a measuring unit (e.g.*	Sow at 3–5 cm depth.

		mm, cm…)	
	Watering technique	*Describe watering tool, technique and frequency during sowing and germination*	• Use watering can with fine rose head. • Light watering daily or as needed. • Keep moist but not waterlogged.
	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 seedbeds or trays under shade structure.
	Environmental conditions	*Describe the environmental conditions where germination took place (temperature, humidity, and photoperiod)*	• Temperature: 20–30°C • Moderate humidity • Partial sunlight • Natural photoperiod
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 3. **Southern & Western Zone** November – April
	Duration until germination	*Average number of days/months/years until seeds germinated*	Slow and irregular: 3–8 weeks (may extend to 2–3 months without scarification).
	% Germination success	*(Number of seeds germinated) x 100 / (Total number of seeds sowed)*	Germination is very good and uniform, reaching 70% after one week and 85% after two weeks from 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 or large pots • Secateurs or hammer (for cracking) • Sieves • Watering can • Labels and markers • Shade net • Soil mixing tools

+ ***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.***

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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 mixed in substrate. After 6–8 weeks: • NPK (e.g., 15:10:10 or 15:17:17) diluted in water. • Apply every 3–4 weeks at low rate
	Watering technique	*Describe watering tool, technique and frequency while growing the plants*	• Water once daily during dry periods. • Reduce watering during rainy season. • Avoid waterlogging.
	Plant growing facilities	*Describe the facilities where the plant growing took place (e.g. glasshouse, outdoors, shaded area...)*	• Outdoor nursery under shade net. • Hardened gradually by reducing shade after 4–6 months.
	Environmental conditions	*Describe the environmental conditions where the plant growing took place (temperature, humidity, light levels)*	• Temperature: 20–32°C • Moderate humidity • Gradual exposure to full sunlight during hardening phase
Success	**Number of days until first potting**	*Average number of days since the start of seeds sowing until first potting*	If sown in seedbed: transplant at 21–30 days when 2–3 true leaves appear
	Duration until established plants	*Average number of days/month/years for which the plant growth was monitored until the establishment of plants*	6–8 months in nursery before transplanting
	% Plants established	*(Number of plants established) x 100 / (Total number of plants potted)*	Typically 65–80% survival under good nursery care.

	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….)*	• Fungal rot during germination if overwatered. • Termite damage in nursery stage. • Leaf yellowing (nitrogen deficiency). • Occasional caterpillar damage during seedling growth.
Materials		*List material needed for potting to help with the planning of this activity. E.g. pots, dibbers, labels…*	• Polybags/pots • Potting mix • Dibber • Labels • Watering can • 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.***