

## Seed Propagation Protocol Form

### 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](mailto:africa@bgci.org)

#### GENERAL INFORMATION

<b>Taxon name</b>	<i>Scientific name of the propagated species</i>	<i>Croton megalocarpus</i>	<b>Name/s of propagator/</b>	<i>Name(s) of the person or people that carried out the propagation</i>	
<b>Family</b>	<i>Plant family of the propagated species</i>	Euphorbiaceae	<b>Organisation</b>	<i>Organisation(s) where the propagation was carried out</i>	
<b>Origin of seeds</b>	<i>Site(s) and country where seeds were collected</i>	Arusha, Kilimanjaro, Morogoro	<b>Site and country</b>	<i>Site(s) and country where the propagation took place</i>	Arusha, Kilimanjaro, Morogoro

#### SEED DESCRIPTION & PROCESSING

##### Description of the seeds and the processing of the seeds before seed sowing.

<b>Time of year for seed collection</b>	<i>List month/s of the year when seed collection is best</i>	June–September
<b>Fruit/seed transport</b>	<i>Describe how fruit/seeds have been stored during transport from the field to the nursery</i>	<ul style="list-style-type: none"> <li>• Collected mature fruits are placed in well-ventilated bags (gunny sacks or paper bags).</li> <li>• Avoid plastic bags to prevent heating and fungal growth.</li> <li>• Transported under shade to nursery.</li> <li>• If fruits are still moist, spread thinly to avoid</li> </ul>

		overheating during transport.
<b>Processing of fruits/seeds</b>	<i>Describe how the fruits/seeds are processed in situ or in the nursery (seed extraction methods, seed cleaning, handling of fruits/seeds...)</i>	<ul style="list-style-type: none"> <li>Fruits are dried under shade for 2–5 days until capsules split open.</li> <li>Seeds are extracted manually after dehiscence by cracking the fruits shell with a knife handle</li> <li>Clean by removing debris and empty seeds.</li> <li>Further shade-dry seeds for 3–7 days to reduce moisture content.</li> <li>Avoid direct sun to prevent viability loss.</li> </ul> <p>About 4 kg of fruits produce 1 kg of seeds</p>
<b>Method to assess seed viability</b>	<i>Describe method used to estimate seed viability (e.g. floating test, cut test, tetrazolium test, X-ray test)</i>	<ol style="list-style-type: none"> <li><b>Cut test:</b> <ul style="list-style-type: none"> <li>Cut seeds longitudinally.</li> <li>Viable seeds have firm, white/cream embryos.</li> <li>Empty or darkened seeds are non-viable.</li> </ul> </li> <li><b>Floating test:</b> <ul style="list-style-type: none"> <li>Place seeds in clean water.</li> <li>Viable seeds often sink; empty seeds float. (Note: Less reliable due to winged structure.)</li> </ul> </li> <li><b>Tetrazolium red test (more accurate):</b> <ul style="list-style-type: none"> <li>Seeds soaked and treated with Tetrazolium red solution.</li> <li>Living tissues stain red.</li> </ul> </li> </ol>
<b>% Estimated seed viability</b>	<i>(Number of viable seeds) x 100 / (Total number of seed for which viability was estimated)</i>	Typical viability: 70–90%
<b>Type of seed</b>	<i>Choose one of these options: Orthodox, Intermediate, Recalcitrant or Unknown</i>	Seed is intermediate between orthodox and recalcitrant
<b>Seed size</b>	<i>Include a measuring unit (e.g. mm, cm...)</i>	<ul style="list-style-type: none"> <li>Length: 1.5cm</li> <li>Width: 1.0 cm</li> </ul>
<b>Number of seeds per gram</b>	<i>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)</i>	There about 1000 seeds per kilogram
<b>Seed storage</b>	<i>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.</i>	<p>Properly dried seeds can be stored at room temperature for six months without significant loss in viability</p> <p>For long term storage</p> <ul style="list-style-type: none"> <li>Stored in <b>airtight containers</b> (glass jars or sealed tins).</li> <li>Conditions: <ul style="list-style-type: none"> <li>Temperature: 4–10°C (refrigerator)</li> <li>Low humidity (&lt;8% moisture content)</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>Storage duration: Up to 1–2 years with good viability retention.</li> </ul>
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+ *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.

<b>Procedures</b>	<b>Seed treatment</b>	<i>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.</i>	The seed does not require pretreatment before sowing
	<b>Seed sowing media</b>	<i>Media composition: include percentages/ratio for the different components</i>	<p>Recommended mixture: Tree Sees Production Station -Morogoro</p> <ul style="list-style-type: none"> <li>Top Black Forest soil – 63% (5)</li> <li>Well decomposed Manure – 25% (2)</li> <li>Rice husk – 12% (1)</li> </ul> <p><b>Ratio is 5:2:1</b></p> <p>Well-drained and sterilized if possible.</p>
	<b>Container</b>	<i>Describe size and material of the container in which seeds are sown</i>	<ul style="list-style-type: none"> <li>Seed trays or nursery beds</li> <li>Polybags (10–15 cm diameter, 15–20 cm depth)</li> <li>Plastic material with drainage holes</li> </ul>
	<b>Seed spacing</b>	<i>Describe the recommended spacing between the seeds when sown. Include a measuring unit (e.g. mm, cm...)</i>	<ul style="list-style-type: none"> <li>In seedbeds: 5–10 cm between seeds</li> <li>In trays: one seed per cell</li> </ul>
	<b>Seed depth</b>	<i>Describe how deep the seeds are sown. Include a measuring unit (e.g. mm, cm...)</i>	Sown at 1–2 cm depth (about 1–2 times seed size).
	<b>Watering technique</b>	<i>Describe watering tool, technique and frequency during sowing and germination</i>	<ul style="list-style-type: none"> <li>Use watering can with fine rose head.</li> <li>Water gently to avoid seed displacement.</li> <li>Frequency: Once daily or as needed to maintain moist (not waterlogged) soil.</li> </ul>

	<b>Germination facilities</b>	<i>Describe the facilities where the germination of seeds took place (e.g. close case, outdoor shaded area, heated bench, covered/bagged container...)</i>	<ul style="list-style-type: none"> <li>• Outdoor nursery under 50% shade net</li> <li>• Raised seedbeds</li> <li>• Protected from heavy rain and direct sun</li> </ul>
	<b>Environmental conditions</b>	<i>Describe the environmental conditions where germination took place (temperature, humidity, and photoperiod)</i>	<ul style="list-style-type: none"> <li>• Temperature: 20–30°C</li> <li>• Humidity: Moderate to high</li> <li>• Photoperiod: Natural daylight</li> </ul>
<b>Success</b>	<b>Time of year for seed germination</b>	<i>List month/s of the year when seed germination is best</i>	<ol style="list-style-type: none"> <li><b>1. Northern &amp; Eastern Zone</b> <ul style="list-style-type: none"> <li>• October – December</li> <li>• March – May</li> </ul> </li> <li><b>2. Central Zone</b> <ul style="list-style-type: none"> <li>• November – April</li> <li>• May – October</li> </ul> </li> <li><b>3. Southern &amp; Western Zone</b> <ul style="list-style-type: none"> <li>• November – April</li> </ul> </li> </ol>
	<b>Duration until germination</b>	<i>Average number of days/months/years until seeds germinated</i>	10–30 days
	<b>% Germination success</b>	<i>(Number of seeds germinated) x 100 / (Total number of seeds sowed)</i>	Germination is good and uniform. It attains 30% after 15 days and 75% after 30 days
<b>Materials</b>		<i>List the materials needed for seed germination to help with the planning of this activity. E.g. trays, sieves, dibbers, labels, ruler...</i>	<ul style="list-style-type: none"> <li>• Seed trays or nursery beds</li> <li>• Polybags</li> <li>• Sieved soil and sand</li> <li>• Compost</li> <li>• Watering can</li> <li>• Labels and marker</li> <li>• Ruler</li> <li>• Sieve</li> <li>• Shade net</li> </ul>

+ *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	<b>Growing Media</b>	<i>Media composition: include percentages/ratio for the different components</i>	<p>Recommended mixture: Tree Seed Production-Morogoro</p> <ul style="list-style-type: none"> <li>• Top Black Forest soil – 63% (5)</li> <li>• Well decomposed Manure – 25% (2)</li> <li>• Rice husk – 12% (1)</li> </ul> <p><b>Ratio is 5:2:1</b></p>
	<b>Container</b>	<i>Describe size and material of the container in which plants are potted</i>	Black polyethylene bags of height 8–10 cm and diameter 101.4 mm or 4”
	<b>Fertiliser</b>	<i>If used, include: type (organic or inorganic); nutrient composition and its ratio; and application (added to soil, dissolved on water, foliar application)</i>	<p>Type:</p> <ul style="list-style-type: none"> <li>• Organic (well-decomposed compost or farmyard manure)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Inorganic NPK (e.g., 20:10:10)</li> </ul> <p>Application:</p> <ul style="list-style-type: none"> <li>• Mixed into soil before sowing (organic)</li> <li>• Light liquid feeding 2–3 weeks after germination</li> </ul>
	<b>Watering technique</b>	<i>Describe watering tool, technique and frequency while growing the plants</i>	<ul style="list-style-type: none"> <li>• Watering can or drip irrigation</li> <li>• Frequency: 2–3 times per week depending on weather</li> <li>• Avoid overwatering</li> </ul>
	<b>Plant growing facilities</b>	<i>Describe the facilities where the plant growing took place (e.g. glasshouse, outdoors, shaded area...)</i>	<ul style="list-style-type: none"> <li>• Outdoor nursery under shade</li> <li>• Hardened gradually in full sun before transplanting</li> </ul>
	<b>Environmental conditions</b>	<i>Describe the environmental conditions where the plant growing took place (temperature, humidity, light levels)</i>	<ul style="list-style-type: none"> <li>• Temperature: 20–30°C</li> <li>• Moderate humidity</li> <li>• Full sunlight after hardening</li> </ul>
	Success	<b>Number of days until first potting</b>	<i>Average number of days since the start of seeds sowing until first potting</i>
<b>Duration until established plants</b>		<i>Average number of days/month/years for which the plant growth was monitored until the</i>	3–6 months in nursery before field transplanting

		<i>establishment of plants</i>	
	<b>% Plants established</b>	<i>(Number of plants established) x 100 / (Total number of plants potted)</i>	Typical survival rate: 70–90%
	<b>Health observations</b>	<i>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....)</i>	<p>During germination:</p> <ul style="list-style-type: none"> <li>• Damping-off (fungal disease)</li> </ul> <p>During seedling stage:</p> <ul style="list-style-type: none"> <li>• Leaf miners</li> <li>• Aphids</li> <li>• Yellowing (nitrogen deficiency)</li> </ul> <p>Control:</p> <ul style="list-style-type: none"> <li>• Good drainage</li> <li>• Proper spacing</li> <li>• Organic pesticide if necessary</li> </ul>
<b>Materials</b>		<i>List material needed for potting to help with the planning of this activity. E.g. pots, dibbers, labels...</i>	<ul style="list-style-type: none"> <li>• Polybags (15–20 cm diameter)</li> <li>• Potting mix</li> <li>• Dibber</li> <li>• Watering can</li> <li>• Labels</li> <li>• Shovel</li> <li>• Shade net</li> </ul>

+ *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.*