## 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.**

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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* | *Milicia excelsa* | **Name/s of propagator/** | *Name(s) of the person or people that carried out the propagation* | |
| **Family** | *Plant family of the propagated species* | Moraceae | **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 | | |
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| **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* | November to January |
| **Fruit/seed transport** | *Describe how fruit/seeds have been stored during transport from the field to the nursery* | • Collect ripe fruits from ground soon after natural shedding<br>• Place in ventilated baskets or sacks (avoid plastic).<br>• Keep shaded and cool.<br>• Transport to nursery within 24–48 hours to prevent fermentation. |

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| **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...)* | **Extraction of small quantity**<br>• The fresh fruits are macerated in water for about one day, dried fruits take three to four days<br>• Then squashed by hand to squeeze the seeds out of pulp<br>• The pulp, skin, empty seeds and water are poured off leaving clean , filled seeds at the bottom<br><br>**Extraction of bulk quantities**<br>By using gravel<br>• The fresh fruits are macerated in water for about one day, dried fruits take three to four days<br>• They are mixed with gravel in a proportion by weight of one part gravel and two parts fruits<br>• Together with plenty of water, they are poured off to leave the seeds and gravel at the bottom<br>• The gravel is picked out by hand or separated from the seeds by washing through a sieve with mesh just small enough to retain the gravel<br>• Final seeds are then dried under the sun<br><br>by using fresh extraction machine from KIMSEED<br>• The fresh fruits are macerated in water for about one day, dried fruits take three to four days<br>• The mixture is poured into machine for grinding to separate seeds from fruits<br>• Mixture is collected then separated from the seeds by washing through a meshed sieve using fresh water from horse pipe<br>• Final seeds are then dried under the sun<br><br>About 40kg of fruits produce 1kg of clean 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. **Floating Test (simple nursery method):**<br><br>Place seeds in water viable seeds usually sink, floating seeds are discarded.<br><br>2. **Cut Test:**<br><br>Cut seed to observe embryo condition viable seeds show firm, cream-colored embryo.<br><br>3. **Tetrazolium red test (more accurate):**<br><br>Seeds soaked and treated with Tetrazolium solution living tissues stain red. |
| **% Estimated seed viability** | *(Number of viable seeds) x 100 / (Total number of seed for* | Viability %= (Total tested÷Viable seeds)×100<br><br>Typical viability: **40–70%** (seeds lose viability quickly). |

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| | *which viability was estimated)* | |
| **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…)* | The seed is small and light, about 1.5mm long and 1.0mm broad |
| **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 are about 400,000 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.* | Seeds are short-lived.<br>• Facility: Refrigerator<br>• Temperature: **2–5°C**<br>• Humidity: Low (below 50%)<br>• Container: Airtight container with silica gel<br>• Storage duration: Best sown within 3–6 months<br>Long storage significantly reduces viability. |

+ ***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** | | | |
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| **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 pre-treatment required. |
| | **Seed sowing media** | *Media composition: include percentages/ratio for* | Recommended mixture: TSTP-Morogoro<br>• Top Black Forest soil – 63% (5) |

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| | | *the different components* | • Well decomposed Manure – 25% (2)<br>• Rice husk – 12% (1)<br><br>Ratio is 5:2:1<br><br>Well-drained and sterilized if possible. |
| | **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…)* | Broadcast evenly or 1–2 cm spacing |
| | **Seed depth** | *Describe how deep the seeds are sown. Include a measuring unit (e.g. mm, cm…)* | Sown on surface and lightly cover with 2–3 mm fine sand, do not bury deeply. |
| | **Watering technique** | *Describe watering tool, technique and frequency during sowing and germination* | • Fine mist watering can or knapsack sprayer<br>• Water gently once daily<br>• Keep moist but 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...)* | • Shaded nursery (50–70% shade net)<br>• Protective screen house |
| | **Environmental conditions** | *Describe the environmental conditions where germination took place (temperature, humidity, and photoperiod)* | • Temperature: 25–30°C<br>• Humidity: 70–80%<br>• Light: Partial shade |
| **Success** | **Time of year for seed germination** | *List month/s of the year when seed germination is best* | February, March and April |
| | **Duration until germination** | *Average number of days/months/years until seeds germinated* | 10–30days |
| | **% Germination success** | *(Number of seeds germinated) x 100 / (Total number of seeds* | Germination is good but sporadic. It attains 30% after two weeks and 60% after four weeks from sowing. |

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| | | *sowed)* | |
| **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<br>• Sieves<br>• Fine sand<br>• manure<br>• Watering can<br>• Labels and markers<br>• Ruler<br>• 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 | | | |
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| **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: NTSP<br>• Black Forest soil – 63%<br>• Rice husk – 12%<br>• Well decomposed Manure – 25%<br>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”<br>• Seed trays 15cm x 15 cm |
| | **Fertiliser** | *If used, include: type (organic or inorganic); nutrient composition and its ratio; and application (added to soil, dissolved on water, foliar application)* | After transplanting:<br>Type: 1. Organic fertilizer<br>• Farm yard manure<br>2. Inorganic fertilizer<br>• NPK (15:15:15)<br>• Foliar fertilizer (18:20:21+TE)<br>Application:<br>• Mixed into potting soil or<br>• Diluted liquid feed every 2–3 weeks |
| | **Watering technique** | *Describe watering tool, technique and frequency while growing the plants* | • Watering can or hose with fine nozzle<br>• 2–3 times per week<br>• Reduce frequency during hardening |
| | **Plant growing facilities** | *Describe the facilities where the plant growing took place (e.g. glasshouse, outdoors, shaded area...)* | • Shaded nursery initially<br>• Gradual hardening under full sun |
| | **Environmental conditions** | *Describe the environmental conditions where the plant growing took place (temperature, humidity, light levels)* | • Temperature: 20–30°C<br>• Moderate humidity<br>• Increasing sunlight exposure over time |

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| **Success** | **Number of days until first potting** | *Average number of days since the start of seeds sowing until first potting* | 30–45 days after sowing when seedlings reach 5–10 cm height |
| | **Duration until established plants** | *Average number of days/month/years for which the plant growth was monitored until the establishment of plants* | 5-6 months in nursery before field planting |
| | **% Plants established** | *(Number of plants established) x 100 / (Total number of plants potted)* | Typical establishment rate: 60–85% |
| | **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 (germination stage)<br>• Leaf-eating caterpillars<br>• Termite damage (nursery stage)<br>• Yellowing leaves (nitrogen deficiency)<br><br>Prevent with good drainage and hygiene. |
| **Materials** | | *List material needed for potting to help with the planning of this activity. E.g. pots, dibbers, labels…* | • Poly pots (12 × 20 cm)<br>• Potting mix<br>• Dibber<br>• Labels<br>• 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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