## 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* | *Osyris lanceolata* | **Name/s of propagator/** | *Name(s) of the person or people that carried out the propagation* | |
| **Family** | *Plant family of the propagated species* | Santalaceae | **Organisation** | *Organisation(s) where the propagation was carried out* | |
| **Origin of seeds** | *Site(s) and country where seeds were collected* | Arusha, Kilimanjaro, and Tanga | **Site and country** | *Site(s) and country where the propagation took place* | Arusha, Kilimanjaro, and Tanga-Tanzania |

| 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* | June–September |
| **Fruit/seed transport** | *Describe how fruit/seeds have been stored during transport from the field to the nursery* | • Fruits transported in well-ventilated baskets or perforated plastic crates.<br>• Avoid airtight bags (prevents heating and fungal growth).<br>• Transport time kept short (1–3 days).<br>• Shade maintained during transport. |

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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...)* | • Depulp fruits manually by rubbing in water.<br>• Remove pulp using sieves.<br>• Wash seeds thoroughly to remove sugary residue.<br>• Air-dry under shade for 1–2 days (not direct sun).<br>• Discard damaged or insect-attacked seeds.<br><br>About 8kg 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:**<br>• Cut seeds longitudinally.<br>• Viable seeds have firm, white/cream embryos.<br>• Empty or darkened seeds are non-viable.<br><br>2. **Floating test:**<br>• Place seeds in clean water.<br>• Viable seeds often sink; empty seeds float. *(Note: Less reliable due to winged structure.)*<br><br>3. **Tetrazolium red test (more accurate):**<br>• Seeds soaked and treated with tetrazolium red solution.<br>• Living tissues stain red |
| **% Estimated seed viability** | *(Number of viable seeds) x 100 / (Total number of seed for which viability was estimated)* | Typical viability: 60–80% |
| **Type of seed** | *Choose one of these options: Orthodox, Intermediate, Recalcitrant or Unknown* | Recalcitrant |
| **Seed size** | *Include a measuring unit (e.g. mm, cm…)* | Approximately 7 mm in diameter. |
| **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 10000 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.* | Best sown fresh, if storage is necessary:<br>• Short-term only (1–3 months).<br>• Temperature: 4–10°C (refrigerator).<br>• Humidity: 8–10% moisture content.<br>• Container: Airtight container with desiccant.<br><br>Viability declines rapidly after 3 months |

\+ ***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 dormancy; no scarification needed. |
| | **Seed sowing media** | *Media composition: include percentages/ratio for the different components* | Recommended mixture: Tree Seed Production Station-Morogoro<br>• Top Black Forest soil – 63% (5)<br>• Well decomposed Manure – 25% (2)<br>• Rice husk – 12% (1)<br>**Ratio is 5:2:1**<br>Well-drained and sterilized if possible. |
| | **Container** | *Describe size and material of the container in which seeds are sown* | • Seed trays or germination beds.<br>• 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 seed trays: 3–5 cm apart.<br>• One seed per pot when sown directly. |
| | **Seed depth** | *Describe how deep the seeds are sown. Include a measuring unit (e.g. mm, cm…)* | Sow at 1–2 cm depth. |
| | **Watering technique** | *Describe watering tool, technique and frequency during sowing and germination* | • Use watering can with fine rose head.<br>• Light watering once daily (morning).<br>• 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 shaded nursery (50% shade net).<br>• Raised seedbeds or trays. |
| | **Environmental conditions** | *Describe the environmental conditions where germination took* | • Temperature: 20–30°C<br>• Relative humidity: Moderate to high (60–80%) |

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| | | *place (temperature, humidity, and photoperiod)* | • Partial shade |
| **Success** | **Time of year for seed germination** | *List month/s of the year when seed germination is best* | 1. **Northern & Eastern Zone**<br>• October – December<br>• March – May<br>2. **Central Zone**<br>• November – April<br>• May – October<br>3. **Southern & Western Zone**<br>• November – April |
| | **Duration until germination** | *Average number of days/months/years until seeds germinated* | 30–90 days, germination is slow and sometimes irregular. |
| | **% Germination success** | *(Number of seeds germinated) x 100 / (Total number of seeds sowed)* | Germination is fair and moderately uniform. The germination period id about six to eight weeks during which only about 50% of seeds can be expected to germinate |
| **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 poly pots<br>• Sieves<br>• Watering can<br>• Labels and marker<br>• Ruler<br>• Shade net<br>• Clean water source<br>• 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.***

# 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: Tree Seed Production Station-Morogoro<br>• Top Black Forest soil – 63% (5)<br>• Well decomposed Manure – 25% (2)<br>• Rice husk – 12% (1)<br>**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 media.<br>• Optional: NPK (e.g., 20:10:10) applied lightly after 4 weeks.<br>Application: Dissolved in water and applied to soil.<br>NB: Being a legume, it fixes nitrogen (low N fertilizer required). |
| | **Watering technique** | *Describe watering tool, technique and frequency while growing the plants* | • Water once daily during dry periods.<br>• Reduce watering during rainy season.<br>• 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.<br>Hardened gradually by reducing shade after 2–3 months. |
| | **Environmental conditions** | *Describe the environmental conditions where the plant growing took place (temperature, humidity, light levels)* | • Temperature: 20–32°C<br>• Moderate humidity<br>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: 60–90 days after germination. |
| | **Duration until established plants** | *Average number of days/month/years for which the plant growth was monitored until the establishment of plants* | 6–12 months in nursery before field planting.<br>Ready when seedlings reach 30–40 cm height. |
| | **% Plants established** | *(Number of plants established) x 100 / (Total number of plants potted)* | Typically 60–80% survival after potting (good management). |

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| | **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 damping-off (during germination).<br>• Leaf yellowing (nitrogen deficiency).<br>• Root rot if overwatered.<br>• Pest: Aphids occasionally observed during seedling stage.<br>• Nutrient deficiency (yellowing leaves – nitrogen deficiency). |
| **Materials** | | *List material needed for potting to help with the planning of this activity. E.g. pots, dibbers, labels…* | • Poly pots<br>• Potting soil mix<br>• Dibber<br>• Labels<br>• Watering can<br>• Shovel<br>• Wheelbarrow |

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