



Protocol for the establishment of on-farm nurseries for a safe coconut germplasm movement in Grand-Lahou.

The rearing of coconut seedlings in well-maintained nurseries facilitates an efficient selection of normal uniform seedlings. However, care must be taken in choosing the seedlings to start a plantation. High quality seedlings allow to sustain the coconut palms productive and economic for more long years in the field under extremely variable conditions. The following protocol can be applied for both the genebank and hybrid trials.

1. Nursery Site Selection

- 1.1 Select an open, flat, sandy/sandy loam soil, low gradient and well drained area.
- 1.2 Minimum area of 3,600 m² to accommodate about 12,000 seednuts for 50 ha.
- 1.3 Have light or loose textured soil to facilitate nursery operations.
- 1.4 Have a good source of water without possibility of being flooded.
- 1.5 Be accessible to transportation.
- 1.6 Have a fence for security.
- 1.7 Be far from existing potential sources of coconut insect pests and diseases, e.g., saw mills, pile of decaying logs, site to animal manure, etc.
- 1.8 Have a shed to house the implements and supplies; farm implements and small equipment; a source of water for irrigation; and sufficient trained manpower.

2. The Seedbed

- 2.1 Should preferably be in the center of the nursery, cleared, plowed and harrowed to a fine tilth.
- 2.2 Located 15–25 cm above the ground level while distance among two seed nuts layers should be positioned at 25 cm distance.
- 2.3 Have 5 seedlings layers per one bed laid in trench in which the depth is 10-15 cm, placed in to one direction and opposite direction to the adjoining rows. Seed nuts placed horizontally and simply cover with soil so that upper surface of the seed nut is merely visible.
- 2.4 Seedbed dimensions: elevation: 10-20 cm high to provide drainage; width: 1 m to avoid stepping on seednuts during maintenance and transfer operations; length: a 2 m long seedbed is ideal for easy inspection, management and maintenance; a seedbed measuring 1 x 40 m can accommodate about 1,000 seednuts; pathway: 0.75-1 m between seedbeds should be provided to facilitate inspection, selection, pricking, maintenance and seedling transfer activities.

3. Sowing of seednuts

- 3.1 Plant nuts firmly either upright or slightly tilted with the germ end at the top, close to one another to prevent them from floating in case of heavy rains.
- 3.2 Cover nuts with soil, with about 2/3 of their size buried.
- 3.3 Keep a record file, a sign board, placed in front of each bed with the following information: name of variety/type; date of sowing; number of nuts sown; seedbed number; date when nuts are harvested; date when nuts are received in the nursery.
- 3.4 Mulch with coconut fronds of 3-5cm coir layers, or sawdust, paddy husks, or weed trash.

4 Maintenance of Seedbed

- 4.1 Water daily except when it is raining.
- 4.2 Weed whenever necessary. Maintain surveillance for secondary hosts of the CILY phytoplasma, and remove them when spotted.
- 4.3 Provide partial shading when needed.
- 4.4 Inspect for disease and pest incidence.

5 Pricking

- 5.1 Plant seedlings in the field nursery either directly in soil or in polybags when the sprout emerges through the husk to a height of 4-6 cm, to allow them more space to grow.
- 5.2 Prick, once a week, seedlings of the same age on the same day and immediately plant them in the field or polybag nursery.
- 5.3 Record date of germination and date of each transfer to the field or polybag nursery.
- 5.4 After pricking the germinated seednuts from the seedbed, refill the vacated plot with soil to not destabilize the remaining un-germinated seednuts.
- 5.5 Discard all nuts producing sprouts, which are multiple, thin or etiolated, bent or spindled, and albinos.

6 The Polybag Nursery

- 6.1 Have polybags, preferably black, UV resistant for durability and measuring 40 x 40 x 0.015 cm (for smaller nuts) or 45 x 45 x 0.015 cm (for bigger nuts) with 8-10 holes at the bottom sides, is half-filled with soil and compost mixed at 50:50 ratio.
- 6.2 Use decomposed sawdust, corncobs, rice hull and other organic materials to reduce the weight of the half-filled polybag and improve soil fertility.
- 6.3 If the polybags are not gusseted (with folds at the bottom), the bottom corners should be folded inward to make the bottom of the bag round and for it to stand firmly. The open edge of the bag is also folded back (about 3 cm) to prevent it from tearing easily.
- 6.4 Place the germinated nut in the half-filled bag with sprout in the upright position in the center of the bag.
- 6.5 Fill up the bag with soil with the sides slightly pressed to keep the nut firm until it is fully covered.
- 6.6 When the polybagged seedlings are laid out in the polybag nursery, they are ready.

7 Laying Out of the Polybag Nursery (Staking)

- 7.1 Keep equal setting of the seednuts at optimum distance for them to grow and develop normally following a triangular system with equal spacing of 60 cm.
- 7.2 Have the following materials:
 - About 30 m rope or twine for establishing a straight line and making a 3, 4, 5 triangular.
 - 100 pcs bamboo pegs or equivalent 30 cm long.
 - Measuring tape or stick
 - Twine for making 30-cm spaces, about 10 m long
 - Pieces of stick, 52 cm long

- A sharp bolo, or its equivalent.
- Compass and marking pen.
- A 60-cm long spacing in triangular manner.

- 7.3 Orient rows in a North-South direction to minimize shading.
- 7.4 Mark about 10 m twine every 30 cm along its entire length. Establish a straight line and a 90° corner with the longer side towards the North. This is done by making a 3, 4, 5 triangle using the 30 m rope. Boundaries are set by means of rope or twine to guide the setting of rows. This is made to establish four straight boundary lines and four 90° corners.
- 7.5 Lay the 10 m string in the direction of the North and then mark the 30 cm spaces.
- 7.6 Align the string marked every 30 cm and subsequently 30 cm marks. Repeat the procedure to make rows 3, 4, 5, etc. To establish 60 cm, remove the pegs every other 30 cm starting from the second mark in line 2. These are marked X in the opposite figure. As the work progresses the marks are pegged every 60 cm by estimation.
- 7.7 Place the polybagged seedlings in front of the stake, set firmly and with the erect shoot aligned at the stake. Set the emerging shoot in only one direction at a point closest to the stake.
- 7.8 Set the polybagged seedlings in the same order as they germinated.
- 7.9 Place the earliest germinating seedlings in the first row in the eastern side of the area, and the last ones in the western section of the area to reduce competition from sunlight.
- 7.10 Select vigorous seedlings, culling or judging by age.
- 7.11 Place a signboard indicating the type/variety, the number of seedlings and date of sowing is installed in front of each plot.

8. Maintenance of the Polybagged Nursery

- 8.1 Water under dry weather conditions at least once in four days.
- 8.2 Weed once/twice a month, and inspect for pest and disease incidence.
- 8.3 Apply mixed fertilizers directly to the soil for each seedling around the nuts as follows:

Age (Months) (After germination)	(NH ₄) ₂ SO ₄ (21-0-0) (g)	KCl (0-0-60) (g)	or	NaCl (g)
2	20	20		20
5	40	45		40

- 8.4 Cultivate the soil lightly to promote faster dissolution and absorption of fertilizer.
- 8.5 For termites attack, soak seednuts 3 minutes in 20% cloropyrifos, 3-5 mL of water and spread to the soil.
- 8.6 Remove not germinated seedlings after 5 months from laying.
- 8.7 Allow laid seed nuts to grow until 5 month time. Once rejected seed nuts are removed from the field, germinated seedlings are removed after 7 months times from the laying when disease affected and low quality seedlings are removed from the nursery.
- 8.8 Seedlings which complete 7 months are recommended for field establishment. At 6-8 months after polybagging, leaf splitting occurs, indicating that the seedlings are ready for field planting.