Manual for Hardening Tissue Culture Bananas

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Tissue culture bananas present a clear opportunity for farmers to become for efficient in their farming operations. *In vitro* propagation of bananas is relatively simple. However, if certain practices are not applied within the acclimation stages of the production process, then huge amount of financial resources may be lost. Hence this production manual has been tailored to guide the nursery manager in the most efficient ways of producing top quality hardened tissue culture bananas which would guarantee good field performance.

In vitro to ex vitro conditions

Tissue culture-produced bananas that are ready for transfer to *ex vitro* conditions should have developed roots within the *in vitro* environment (Fig. 1).

- Usually, the plantlets within the flasks are maintained at a slightly higher temperature than other cultures in the laboratory (28 ºC).
- Plantlets could be transferred to shaded area at least two days before plantlets are removed from the flask. This will help plants to become more acclimated.

Hardening Stage 1

Planting

- At the Orange Hill Tissue Culture Laboratory a medium comprised of shredded/sifted coconut fiber is used.
- This medium is placed into 1.5 inches celled plastic trays and holes of about 0.4 inches are made for plantlets. (Fig. 2)
- To extract plantlets from flasks, flasks are opened and immersed in water for about 30 seconds
- Then they are emptied into the water and agar is removed from root sections (care must be made not to damage plantlets)
- Plantlets are then planted into the cells of the trays and thoroughly watered until droplets can be seen emanating from the bottom of the cells (watering is controlled)

Treatment

- A slow release fertilizer (eg. Osmocote 14-14-14) is applied 1 week after planting (Fig. 2). Plants are treated with foliar fertilizer using a back pack sprayer once per week. An insecticide (eg. Diazinon, 5-10 ml/3.8 l) maybe used once per month if there is incidence of aphids on the underside of leaves. Watering should be carried out everyday. After 1-1.5 months, plantlets are ready for transfer to the second hardening stage)

Hardening Stage 11

- Polyethylene bags with a dimension 9x8 inches are used for second stage hardening although slightly smaller bags maybe used also (Fig. 3).

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- The ideal conditions for the second hardening stage could have a range of between 40-50% shade
- Normally in St Vincent and the Grenadines potting mixture of rabacca sand and soil mixed in a 1:1 ratio is used. Care should be taken to use potting material which is free of any herbicidal residue.
- Plants at this stage can be placed in shade houses devoid of any impenetrable roofing material as rain acts as a good source of moisture. However in days of low rainfall, irrigation should be done
- 1/2 oz of any fertilizer with higher proportion of nitrogen should be given to the plants twice within the period that they are in the shade house (first application after 2 weeks, second application after 4-5 weeks)
- Plants maybe distributed to field conditions or transported after 1.5-2 months and should be transported in potting bags
- On planting, plastic bags should be removed, collected and discarded properly and plants should be planted with minimal disturbance to the rooting system to avoid shock

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Fig. 1. Tissue culture bananas ready for ex vitro hardening

Fig. 2. Tissue culture bananas under greenhouse. A. plantlets with slow release fertilizer; b. trays with media ready for planting

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Fig. 3. Tissue culture bananas ready for field transfer

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