

Early Varietal Screening of Banana for Resistance to Nematodes

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An early varietal screening method for banana resistance to nematodes has been developed by the CIRAD-FHLOR nematology laboratory in Montpellier. The method follows that developed for the United Fruit Co. hybridization programme at La Lima, Honduras (Pinochet, 1988). In comparison with the latter method, the use of young plants grown using *in vitro* micropropagation considerably facilitates and shortens the screening procedure, which can also be applied at much earlier stages after the creation of hybrids.

Description of the method

The operations are shown diagrammatically in Figure 1 and are performed in a chamber with controlled tropical climatic conditions (temperature 27-28°C, relative humidity 75-80%, photoperiod 12h/12h).

Plant material

After tissue culture, plantlets are transplanted into small pots (30 cm³) containing a sterilized soil mixture. They are hardened off in the air in miniature plastic greenhouses (45 cm x 30 cm) whose covers are raised progressively each day until the plants are fully exposed to the atmosphere. This acclimatisation process takes approximately 3 weeks.

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The plants are then planted out in 800-cm³ pots. After a growth period of two to three weeks, the plants to be inoculated are chosen for homogeneity of size (average approximately 10 cm in height).

Nematodes

Nematodes (*Radopholus similis* Cobb) are kept *in vitro* at 27-28°C in monoxenic culture on carrot slices. The nematodes for inoculation are recovered from the sides of the rearing flasks by rinsing with sterile water.

The water volume in the initial suspension is adjusted to calibrate the inoculum to be applied to the plants. Inoculation is performed by pipetting 1 to 2 ml of the calibrated solution to the soil surface around the plant. Identical volumes of inoculum are collected in a beaker regularly during the operation as a check to enable subsequent monitoring of the average quantity of nematodes inoculated.

Observations

Readings are taken 8 to 10 weeks after inoculation and include both root populations of nematodes and plant development (weight of roots and aerial parts).

Practical aspects

The studies performed show that optimal inoculum is about 100 to 400 *R. similis* per plant. The interval between inoculation and observation varies from 8 to 10 weeks and there should be at least

5 replicates (number of plants) (Sarah *et al.*, 1992a, 1992b).

Inoculum containing 100 *R. similis* with observations after 8 weeks is sufficient for evaluation of resistance (limit of development of nematodes in the tissues). However, inoculum with a higher count (200-400 *R. similis*) and/or later observation (up to 10 weeks) are required for evaluation of tolerance (impact of nematodes on plants).

General comments on the method

The first screening tests performed (Sarah *et al.*, 1992a, 1992b) showed that this early laboratory method was reliable. The results were repeatable and agreed with field observations of the collections at Nyombé, Cameroon and Neufchâteau, Guadeloupe. It can thus now be used by teams involved in varietal improvement. Several minor modifications to the procedure should enable it to be used for screening other nematode species, and especially those of the most important genera: *Pratylenchus* and *Meloidogyne*.

However, the method is only intended for early elimination of plant material sensitive to nematodes. It must necessarily be complemented by field trials of the hybrids which have been successful in this screening. The size of an unavoidable field trial will, nevertheless, be considerably reduced by the early laboratory elimination of plant material which has no or insufficient resistance or tolerance.

References

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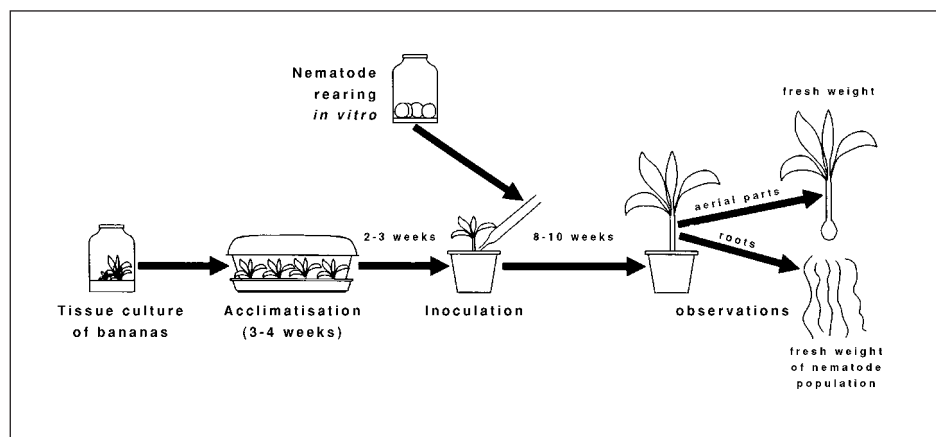


Figure 1. Schematic diagram of the method for varietal screening of bananas for resistance to nematodes.