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MICROPROPAGATION IN BANANA VAR. NENDRAN

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ABSTRACT

Micropropagation of banana variety Nendran (*Musa paradasiaca* L.) was attempted through shoot-tip culture. Shoot tips were grown in MS liquid medium containing coconut water. When 1 cm long shoots were transferred to solid medium minus coconut water, multiple shoots developed. Single shoots were then transferred to the rooting medium. Plantlets could be potted in pro-mix vermiculite 2–3 weeks after rooting and transplanted in the field within three months. One-month-old suckers produced only 7–8 shoots per excised shoot tip whereas 3 months old suckers produced 9–16 shoots per explant.

Key words: Shoot-tip culture, rooting medium, pro-mix vermiculite, multiple shoots.

Bananas and plantain are propagated through suckers of various sizes or pieces of the corm. Since bananas are affected by a disastrous viral disease (bunchy top) the need for generating clean planting stock in large quantities has stimulated interest in the production of clonal material of both cooking and dessert bananas by the use of aseptic micropropagation techniques. The shoot tip multiplication method has a great potential for multiplying elite plants and for producing specific pathogen free planting materials in large numbers. Since they are aseptic, shoot tips can also be used to maintain bacteria and fungus free stock for germplasm exchange, transfer and shipment [1]. Transport of bulky corms is also a problem in banana. Tissue culture offers a solution to all these problems. Certified cultures in germplasm exchange minimise dissemination of unwanted pests and diseases.

MATERIALS AND METHODS

The materials used for the in vitro culture were shoot tips of banana variety Nendran isolated from one and three months old suckers. The outer leaf sheaths were removed till the growing shoot apex measured approximately 1 cm across at their bases and were 2 cm tall. A dissecting microscope and scalpel were used to remove the outer leaf sheaths.

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The liquid culture medium for shoot apex isolation [2] contained MS salts supplemented with inositol (5.55 μM), thiamine HCl (2.97 μM), benzyl aminopurine (22.0 μM), sucrose (0.12 μM) and coconut water (15%). The medium was solidified with 0.7% agar for multiple shoot formation. Media for plantlet development consisted of the same ingredients as above but supplemented with 0.25% w/v charcoal [3]. The pH of the media was adjusted to 5.8. The cultures were maintained in an air conditioned storage room with 8 h light and 16 h dark.

The shoot apex was excised by making four incisions with a scalpel into the corm beneath the apex. The excised apex was placed in 50 ml conical flask and sterilized with 0.05% mercuric chloride solution. The sterilized apex was transferred from the sterile water to the culture medium. Within 10 days of planting the apex started to turn green, after another 11 days, a small green shoot was clearly visible to the naked eye. When the shoot was 1 cm long and had new leaves, it was transferred to the same solid medium minus coconut water. The excised apex usually grows into a single shoot or plantlet.

A large 3 cm tall single shoot can be forced to produce many smaller shoots (multiple shoots) by cutting it in half longitudinally through the apex. Each half is placed upright in a culture jar containing culture medium solidified with 0.7% agar.

After 4-7 days, the two shoot halves were removed and the outer leaves and blackened shoot bases were trimmed off. At this time new side shoots were clearly visible, and were transferred to the fresh medium. After 2-3 weeks multiple shoots formed. They were separated and transferred to fresh growth medium. The multiple shoot cultures were maintained by transferring to fresh culture medium and separating the multiple shoots in the same way every 3-4 weeks routinely.

Roots were induced by transferring single shoots to culture medium supplemented by 0.25% (w/v) charcoal. The addition of IBA (0.1 μM) enhanced rapid root formation. In the presence of charcoal, white or cream coloured roots were seen at the shoot base within 4-5 days.

RESULTS AND DISCUSSION

Plantlets can be potted in pro-mix–vermiculite medium in small country pots 2–3 weeks after rooting. They can be moved to normal green house conditions within 7–10 days. From small country pots within 3 months the plantlets were ready for soil transplantation. They grew vigorously and showed true to type characteristics. Tissue culture of banana species is normally done by shoot tip culture [4–9].

When one month old suckers was used for shoot apex isolation, growth was not vigorous and the rate of multiple shoot development was also low, producing 2–8 shoots per excised shoot tip whereas shoot tips isolated from 3-month-old suckers produced 9-16 shoots per explant as reported in banana variety Prata genome AAB [10].

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