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MICROPROPAGATION OF BANANA THROUGH SHOOT TIP CULTURE

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THE technique of plant tissue culture is being employed for the improvement and clonal propagation of economically important plants. *In vitro* techniques applied to *Musa* species are aimed at producing pathogen-free plants by thermotherapy[1] and with multiplication[2,3]. Cronauer and Krikorian[4] reported multiplication from excised stem tips and floral apex. In India commercial varieties of banana are seriously affected by bunchy top disease and there is shortage of planting material and pathogen free plants. To overcome these problems, a novel method was tried, viz. *in vitro* culture of shoot tips.

The shoot tips of banana cultivar 'rasabale', with corm tissue, measuring about 1 cm in length, were isolated from field-grown plants. They were surface-sterilized with sodium hypochlorite (13% commercial bleach) for 15 min and then rinsed thrice in sterile distilled water. The shoot tips were reared aseptically on nutrient media after removing 2 or 3 sheathing leaf bases. The nutrient medium used was that of Murashige and Skoog[5] with 4% sucrose (MS). Supplements like benzyladenine (BA), naphthalene acetic acid (NAA) and coconut water (CW) were added to MS and the pH of the medium was adujsted to 5.8. Initially the shoot tips were reared in liquid MS on a filter paper support and after 3 weeks of culture, they were transplanted to MS agar (0.6%) media. All the cultures were maintained at 25±2 C and 55–60% relative humidity with 10 h illumination (150–200 lux) daily.

The pale white shoot tips reared on liquid MS containing BA (1, 2 and 5 mg/l) grew further and became green after 3 weeks of culture (figure 1). On transfer to MS agar medium containing BA, multiple shoots were formed. The maximum number of shoots were noted in the case of 5 mg/l of BA. But the resultant shoots did not increase in length. However when the medium was fortified with CW (10% v/v) after 4 weeks 8–14 shoots developed and the growth of these shoots was luxurient (figure 2). *In vitro* differentiated shoots were isolated individually and transferred to MS + BA (5 mg/l) + CW (10% v/v) where a 10–20-fold increase in the proliferation of shoots occurred (figure 3). Profuse rooting (30–40 roots per shoot) was observed within 2 weeks when they were transferred to MS + NAA (0.5 1 mg/l) and resulted in plantlets (figures 4 and 5).

Such regenerated plantlets, about 10–14 cm in length, were transferred directly to pots containing soil and were maintained in a glass house for about a week (figure 6). Later they were transferred to field and the survival after transplantation has been 100%. Further performace of these plants in the field is under evaluation. In banana, regeneration of plantlets via multiple shoot production is promising for rapid multiplication of elite plants. Further attempts are being made to regenerate plantlets from shoot tips of different indigenous cultivars.

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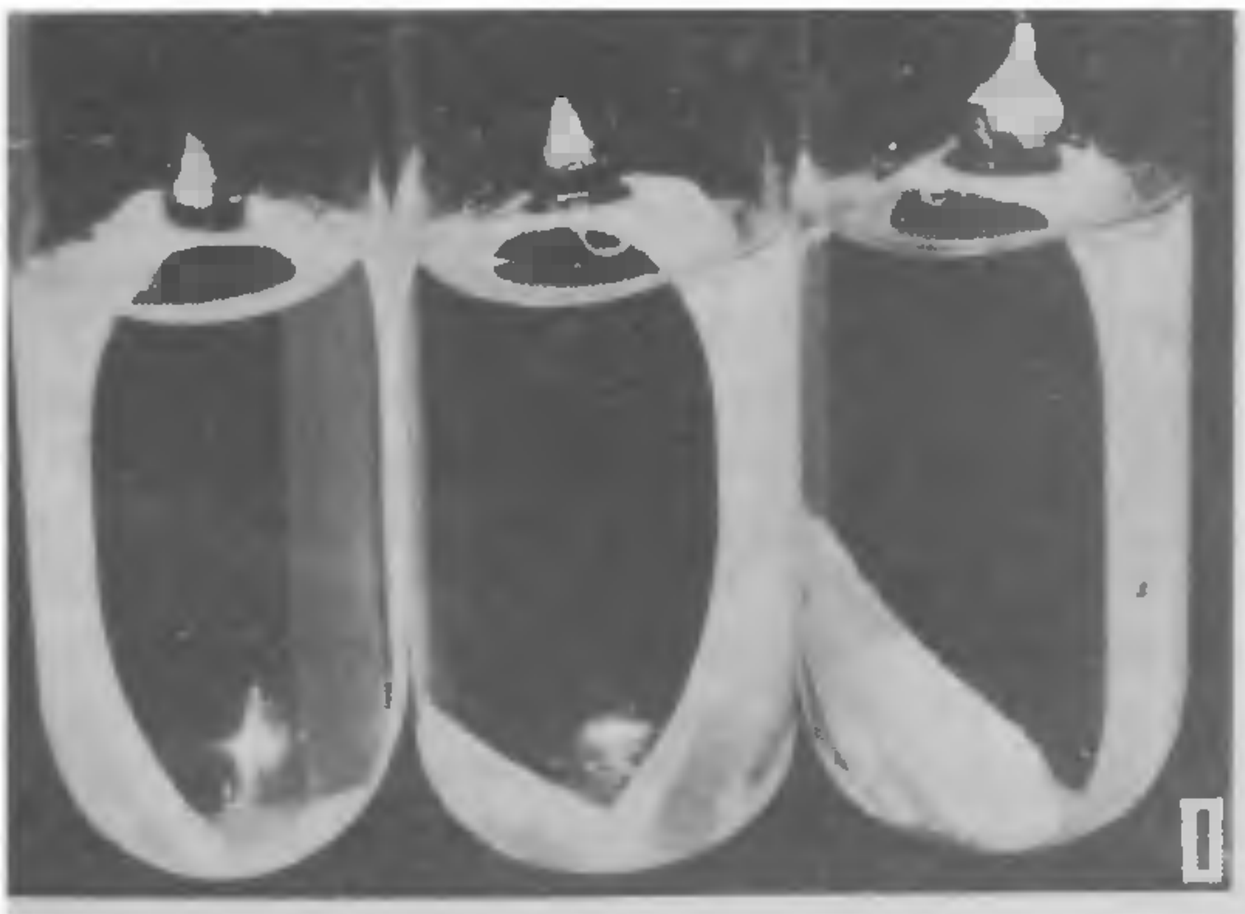
(For figures 1–6 and captions, see next page)



Figures 1–6. **1.** Shoot tips on filter paper support in liquid MS + BA (5 mg/l) after 3 weeks; **2.** Multiple shoots on MS agar + BA (5 mg/l) + CW (10% v/v) after 4 weeks; **3.** Recultured *in vitro* derived shoot (4-week-old) exhibiting multiple shoots on MS + BA (5 mg/l) + CW (10% v/v); **4.** Complete plantlet formed on MS + NAA (1 mg/l) after 2 weeks of transfer; **5.** Regenerated plantlet photographed outside before transfer to soil, (note the roots); and **6.** Transplanted plantlets in soil.