# INDUCTION OF GROWTH IN EXPLANTED INFLORESCENCE AXIS OF BANANA

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WHILE studying the possibility of using tissue culture techniques for clonal propagation of banana, several regions of the plant suggested themselves as 'sites' from which tissue to be cultured might be isolated. Mohan Ram and Steward[1] have reported the induction of callus from the explanted fruit tissue. Excised terminal and axillary buds from the rhizomes of Robusta banana have been induced to develop into plantlets *in vitro*[2,3]. In this paper we report the growth responses of the explanted inflorescence axis of Robusta banana.

Young inflorescence axis (spadix) of Robusta banana (*Musa acuminata* L.) cultivated at the Indian Institute of Horticultural Research, were excised and washed thoroughly in a solution of Teepol. The entire spadices were thoroughly cleaned, the bracts and immature flower buds removed. Discs (5 mm thick) were excised from small pieces of the inflorescence axis and sterilised with $HgCl_2$ (0.2%) for 10–15 minutes. Each disc was washed with autoclaved distilled water several times and cut into quartets under aseptic conditions (figure A). Murashige and Skoog's medium[4] containing 2% sucrose and gelled with 0.8% agar was used as the basal medium (MSB).

The MSB was supplemented with auxins: indole-3-butyric acid (IBA), indole-3-acetic acid (IAA), 2,4-dichlorophenoxy acetic acid (2, 4-D), naphthalene acetic acid (NAA), benzothiozoleoxy acetic acid (BTOA), 2,4,5-trichlorophenoxy acetic acid (2,4, 5-T) and cytokinins: benzyl adenine (BA) 6(YY dimethyl allyl amino) purine (2ip), kinetin (Kn) in different combinations and concentrations to test their efficacy in regulating organogenesis. Each treatment consisted of 12 replicates. Usual protocols for medium sterilization were employed.

Quartets cut from the discs of inflorescence axis failed to elicit any response on MSB. Callus induction occurred in the explant on MSB + 2ip (2 ppm) +2,4, 5-T (0.1–10 ppm). This callus was capable of being maintained for long periods by successive sub-culture. Auxins such as IBA, 2,4-D, NAA, IAA, BTOA and 2,4-D and 2,4,5-T in consort with a cytokinin (Kn, BA, 2ip) in 40 different combinations in the MSB were examined for the growth response of the cultured tissue. Cell proliferation leading to callusing was the immediate response in almost all the cultures in varying degrees. Quartets grown on MSB + 2,4,5-T (2 ppm) developed callus formation with nodular over growths simulating proembryoids. Occasionally root differentiation also took place in callus grown on this medium (figure B). Squash preparations of this callus showed cells of diverse shapes (figure C) and tracheidal elements (figure D). Since organogenesis is often mediated through the formation of callus, and auxins and cytokinins formed the pivot of plant regeneration, various combinations and concentrations of plant growth regulators generally implicated in such phenomena were used in media in order to determine the nature of organ regeneration if any, from the calli. However, none of these treatments induced any organogenesis. Preculture of tissue in the presence of 2,4;5-T (5 ppm) for a period, in conjunction with casein hydrolysate or ammonium nitrate and its abrupt withdrawal in sequence coupled with simultaneous increase in cytokinin levels did not induce any shoot bud induction. On the other hand, calli were prone to rhizogenesis more often than any other forms of organogenesis.

Systematic investigations of schedules of useful and unsuitable combinations of phytohormones have

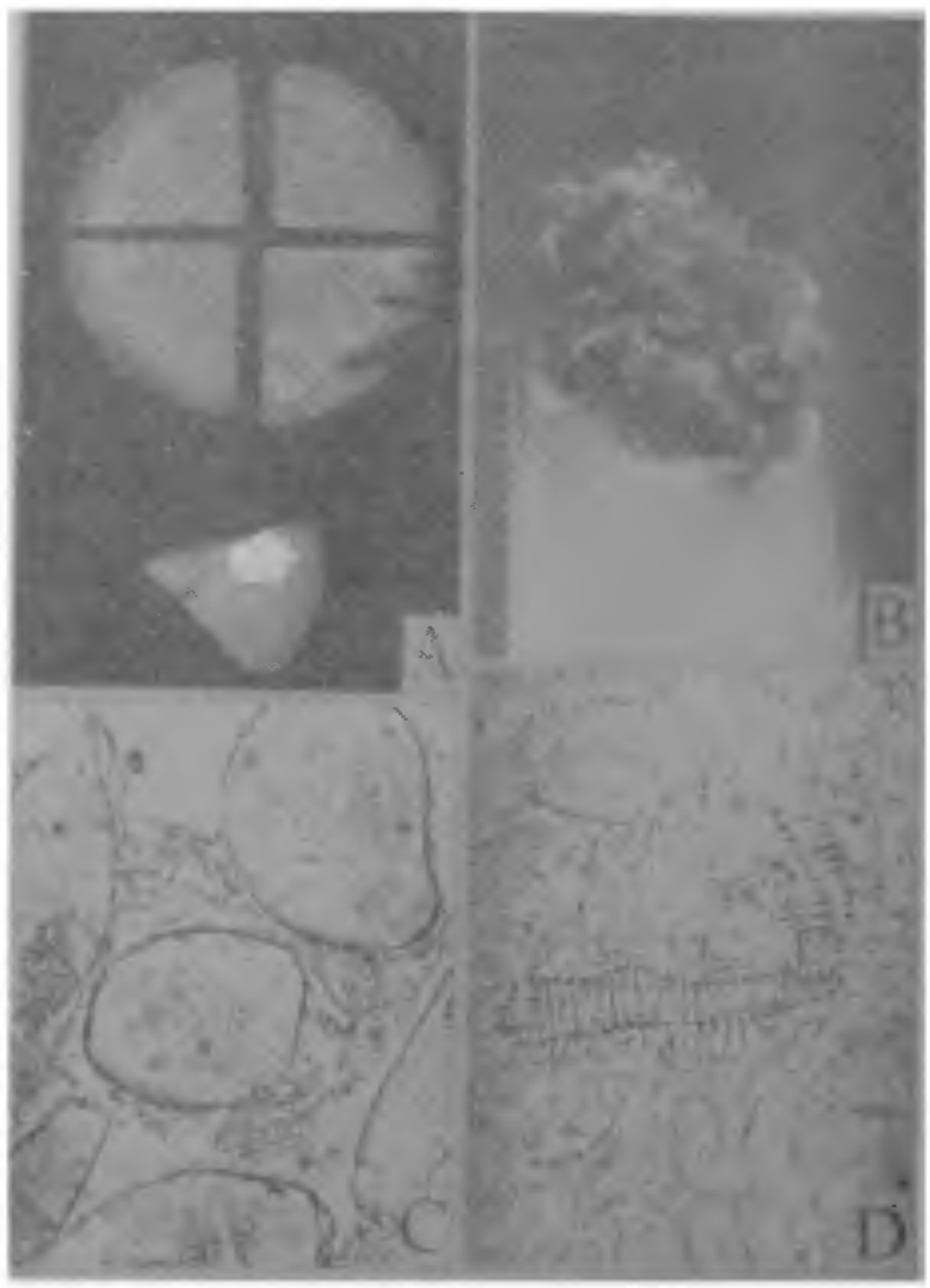


**Figure A.** Disc from banana inflorescence axis cut into quartets **B.** Callus mass showing root differentiation. **C.** Squash preparations of the callus showing cells of diverse shapes. **D.** Squash preparations of the callus showing tracheidal elements.

failed to induce shoot morphogenesis in callus, and it would appear that the latter may as well be influenced by a multiplicity of factors and points to the fact that there may as yet be unappreciated factors that are involved in shoot induction or shoot recalcitrance.

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## *SPIROPES GUAREICOLA* (STEV.) CIF. CAUSING A NEW STORAGE DISEASE OF ORANGES

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DURING a recent survey of the markets at Bangalore, a diseased fruit of loose jacket orange (*Citrus aurantifolia* Sw.) with dark spots was collected. The disease was characterised by the presence of circular to irregular dark patches scattered irregularly on the surface of fruit. On incubation in a moist chamber maintained at 80% R.H. and 30° C, these spots enlarged and covered a large surface of the rind.

On examination, the infected spots were found to contain two fungi closely associated with each other. Spreading on the surface with thick dark mycelia was the "sooty mould"—*Meliola* sp. and overgrowing this was the fungus which was identified as *Spiropes guareicola* (Stev.) Cif., a Hyphomycete. Small portions from the infected spots were transferred to healthy oranges, surface-sterilised with 95% alcohol and washed with sterile water. Infection was established and discernible black spots appeared within five days, proving the pathogenicity. After repeated transfer on to healthy fruits and microscopic examinations of the infected spots, it was clear that the two fungi were consistently associated with each other, apparently showing the hyperparasitism of *Spiropes guareicola* on *Meliola* sp. Reference has been made earlier[1] to the parasitism of *Spiropes guareicola* on *Meliola*.

*Citrus aurantifolia* Sw. is a new unreported host for *Spiropes guareicola*. *Meliola* sp. has been reported earlier[2,3] on *Citrus aurantifolia* leaves but not on fruits.

The distinct symptoms on *Citrus aurantifolia* fruits caused by the combination of *Spiropes guareicola* and *Meliola* sp. are reported here and constitute a new storage disease.

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## TWO MOST SUITABLE INDICES OF LODGING FOR WHEAT

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THE problem of lodging has received the attention of several breeders in crop plants. Lodging is of uncertain occurrence and also differs in intensity when it occurs. This necessitated the evolution of indices of lodging in crop plants such as barley, wheat, maize, etc. With the discovery of the association of plant characters with lodging many plant characters such as root weight and plant height have been suggested as indices of lodging resistance. However, no plant character gave consistent assessment and some mechanical devices, such as breaking strength of the lowest internode, pulling resistance, were introduced. But these too are not dependable at times.

Malkani and Vaidya[1] proposed that lodging occurs due to root system being unable to sustain the load of the above ground parts and also due to the inability of the lowest internode to support the weight of the shoot. They proposed that shoot/root ratio and breaking strength/mothershoot weight ratios be used as indices of lodging resistance. Later, Vaidya and Bhag Singh[2] discovered one more index *viz.* breaking strength/height of the shoot, which proved to be the most important among these three ratio indices. The data of Vaidya and Bhag Singh[2] were further analysed and two, 3-character indices *viz.* shoot × height/root