young germling without rhizoid. Spore germinating *in situ* showed stages of germination similar to liberated spores[6-8] (figures 5–7). These germlings may detach and develop into either the same parental generation[9] or the sexual plants[10].

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IN VITRO STUDIES OF SPIKE DISEASE OF SANDAL (*SANTALUM ALBUM* L.)

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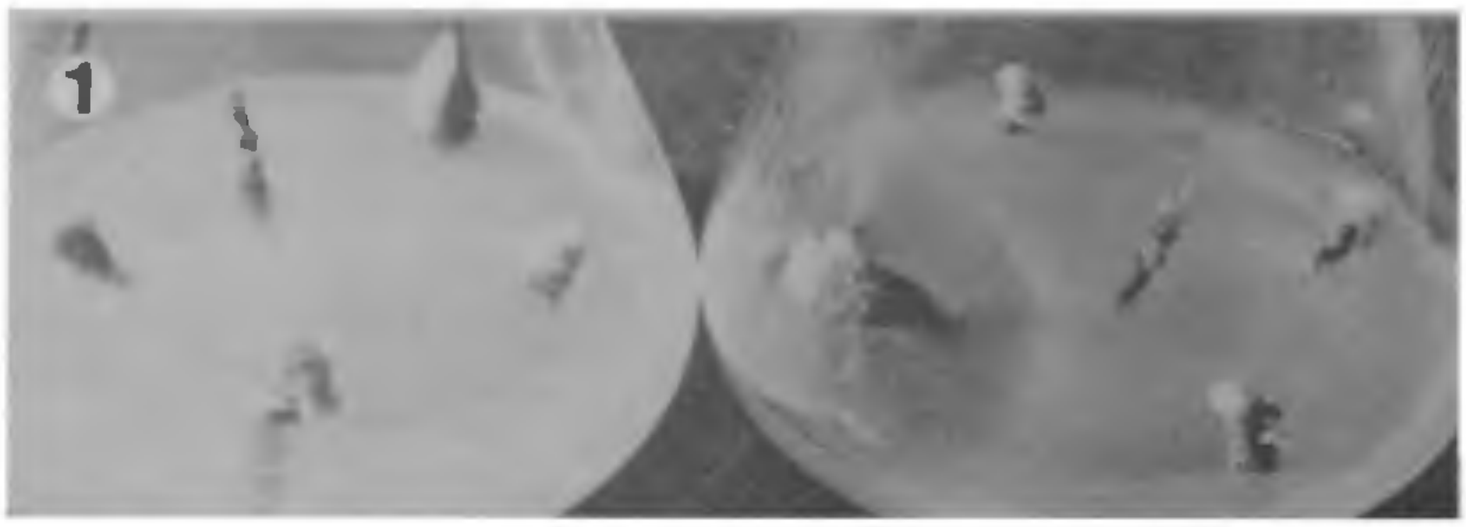
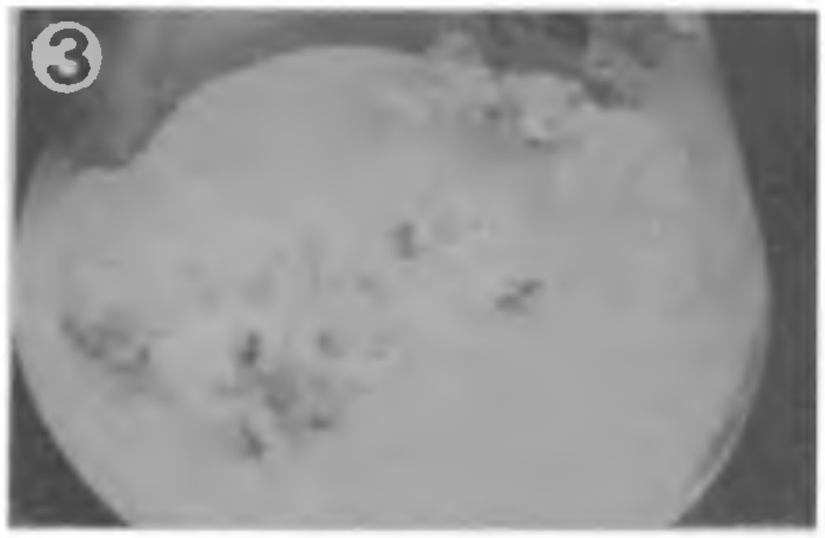
SANDAL spike is a serious disease taking heavy toll in all the sandal growing States of South India, *viz* Karnataka, Tamilnadu and Kerala. The disease has been the subject of interest for more than a century and has been recently reported to be caused by mycoplasma[1,2]. *In vitro* propagation of sandal is attempted by some workers[3-5]. We have made an attempt to culture the healthy and spiked tissues of sandal, using internodal segments as explants.

Young twigs of both healthy and diseased plants were collected from Bannerghatta Reserve Forests of Bangalore district. Defoliated stem pieces were surface-sterilized by washing with liquid carbolic soap several times followed by 0.1 % $HgCl_2$ for 5 min and 50% (v/v) of NaOCl with a few drops of 'Tween-20' (detergent) for 15–20 min. Finally they were thoroughly washed with sterile double-distilled water several times to remove the traces of disinfectants. The surface-sterilized stem pieces were cut into approximately, 1 cm long 'cylinders' and transferred aseptically to flasks (4 pieces each) containing 25 ml of Murashige and Skoog's[6] (MS) or White's[7] basal media supplemented with growth regulators at varying concentrations and combinations.

Segments from healthy plants showed callus initiation in 6–8 weeks after culture, on both MS and White's basal media supplemented with 2,4-dichlorophenoxyacetic acid (2,4-D) (0.1 mg/l) and benzyl adenine (BA) or kinetin (1.0 mg/l) (figure 1). Further growth of the callus was relatively better on MS medium in comparison with White's basal medium. The callus eventually differentiated into embryoids on the same media (figure 3). Spiked segments failed to grow on these media supplemented with 2,4-D and BA or kinetin; instead the callus initiation was seen when the basal media were supplemented with 2 to 5 mg/l of gibberellic acid (GA_3) in addition to 2,4-D and BA or kinetin. Addition of GA_3 to the media did not have any effect on the healthy segments in the initiation of the callus (figures 1, 2). In the diseased tissue the differentiation of callus into embryoids occurred only in the presence of GA_3 (figures 3, 4).

The difference in the response of diseased and healthy segments with respect to callus formation and further differentiation is attributed to the deficiency in the endogenous contents of the growth regulators, particularly gibberellic acid in the spike tissue. Indeed, reduced amounts of endogenous GA_3 content was reported in some viral[8,9] and fungal diseases[10,11]. Further, the symptoms of the disease such as internodal shortening, yellowing (chlorosis) of leaves, reduction in the size of leaves, inhibition of flowering (phyllody), accumulation of starch are comparable to the deficiency symptoms of GA_3. Besides, preliminary trials in our laboratory revealed that the exogenous application of GA_3 to the diseased plants resulted in the recovery of the plants to some extent. It would be interesting to confirm the presence of MLO bodies electron microscopically in such induced callus and regenerated plants.





Figures 1–4. Callus from healthy and spiked internodal segments on MS medium supplemented with 2,4-D (0.1 mg/l) and BA (1 mg/l). **1.** Healthy segments without GA_3 (left) and with GA_3 (2 mg/l) right. **2.** Spiked segments and GA_3 (2 mg/l). **3.** Healthy segments showing differentiation of embryoids. **4.** Spiked segments and GA_3 (2 mg/l) showing differentiation of embryoids.

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NATURAL OCCURRENCE OF TOBACCO ETCH VIRUS (TEV) ON CHILLI IN INDIA

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CHILLI (*Capsicum annuum* Linn)—an important crop grown for its fruits is used as condiment in India. The susceptibility of this crop to mosaic disease was reported as early as 1923[1,2]. During a survey conducted in 1978–79 in Karnataka, some of the isolates of chilli mosaic from the fields showed different symptoms on *C. annuum* cvs California Wonder an Byadgi