SHORT COMMUNICATION

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AMPICILLIN PROMOTES GROWTH AND DIFFERENTIATION OF GINGER CALLUS[1]

PS HAREESH, S SABIJA & B SASIKUMAR[2]
Indian Institute of Spices Research, Kozhikode – 673012, Kerala, India
e-mail : bhaskaransasikumar@yahoo.com Fax : 091-0495-2730294

Many antibiotics are used either as disinfecting agents or as selectable markers in several studies on plant biotechnology. Most transformation techniques rely on the introduction of selectable marker gene(s) for positive selection of transformed cells (Vasil & Thorpe 1994). Antibiotics though used routinely for disinfecting the explants, they are also reported to promote growth and organogenesis in *Bauvardia turnifolia* (Robert et al. 1986) *Antirrhinum majus* (Nakano & Mii 1993) and Dianthus cultivars (Holford & Newbury 1992). The effects of antibiotics on cultured tissues may vary depending upon the source, age of the explants and cultural conditions (Lin et al. 1995). The mechanisms of action of antibiotics on cultured explants has not yet been understood although their growth promoting effects are generally attributed to its auxin like properties (Lin et al. 1995).

The present report deals with the growth promoting effect of ampicillin (Hi-Media, Mumbai) known for its bactericidal activity, on the callus cultures of ginger. The antibiotic was in fact used inadvertently in one of the experiments while assaying the sensitivity of cultured tissues of ginger to kanamycin and hygromycin. Following initial observation on its marked effect on callus growth, detailed studies were carried out.

Friable actively growing calli derived from leaf sheath of ginger (*Zingiber officinale*) (var. Jamaica) was used in the study. MS medium (Murashige & Skoog 1962) supplemented with 2mg/l of 2,4-D was used throughout the experiments. Agar (0.7%) was used as the solidifying agent.

Ampicillin was incorporated in the medium (dispensed in petri plates) at five different concentrations (10, 25, 50, 75, 100µg ml^{-1}). Four replications of ten culture each were set up for each treatment. Callus growth was recorded after 38 days of transferring the actively growing callus on ampicillin medium and percentage growth rate was computed based on fresh weight.

Ampicillin did not have any inhibitory effect on the callus growth but significantly promoted the growth. (Table 1, Fig. 1A). The calli grew profusely in all the antibiotic concentrations. Maximum percent increase in callus growth was observed at 75µg ml^{-1} of the antibiotic.

Interestingly we observed profuse rooting from the callus in 50% of the cultures maintained beyond 38 days. Though ampicillin induced rooting in all the concentrations, rooting was good in the two lower concentrations of the antibiotic. Fig. 1B shows rooted cultures in two of the lower concentrations of the drug after 52 days of culturing. None of the cultures in control produced any roots.

Ginger is one of the major spice crops of India. It is infected by various bacterial and fungal pathogens like *Ralstonia solanacearum, Phythium aphanidermatum* etc. Several

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2. Author for correspondence

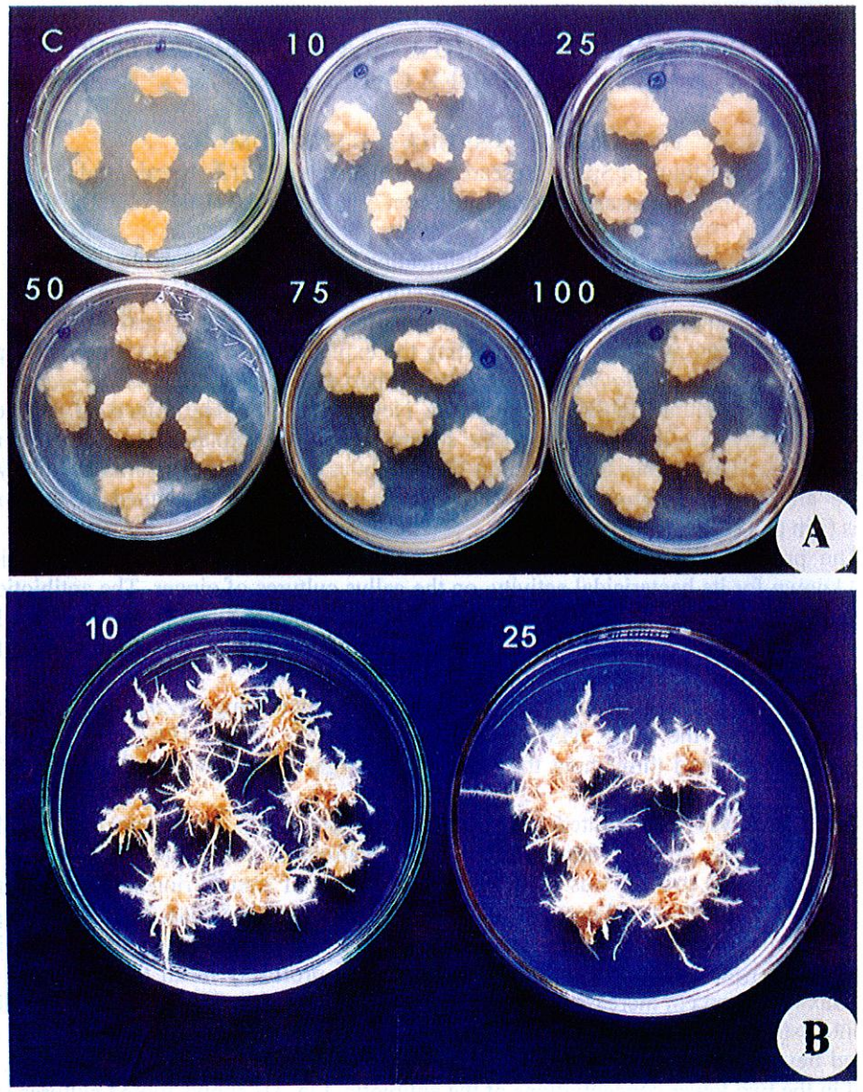

Fig. 1A,B – A. Effect of ampicillin on ginger calli (38 days old culture). C = Control; 10, 25, 50, 75, 100 are concentrations (µg ml^{-1}) of ampicillin. **B.** Root formation in lower concentrations of ampicillin (10, 25µg ml^{-1}) in ginger calli (52 days old culture).

strategies have been proposed for the effective management of the disease including transformation, manipulation of the defense genes etc. Successful tissue culture techniques and regeneration protocol are prerequisites for any transformation studies. In the present study, we found that ampicillin is able to promote not only callus growth but also induce rooting at lower concentrations. Ampicillin may have some application in manipulating callus cultures of ginger.

TABLE 1 – RESPONSE OF GINGER CALLI TO AMPICILLIN

Ampicillin Conc.	Initial wt. of the callus	Final wt. of the callus	Increase in callus wt. after 38 days (g)	Percentage increase
00	2.0	2.46	0.46 ± 0.12	23.02
10	2.5	5.87	3.37 ± 0.23	134.80
25	2.0	4.90	2.90 ± 0.17	145.00
50	2.0	8.26	6.26 ± 0.92	313.00
75	1.5	10.21	8.71 ± 1.30	580.60
100	2.0	6.25	4.25 ± 1.10	212.50

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