In Vitro Cellular and Developmental Biology - Plant

Published by: Society for In Vitro Biology

« previous article | next article »

In Vitro Cellular and Developmental Biology - Plant 40(5):471-474. 2004

doi: 10.1079/IVP2004562

MICROPROPAGATION OF FIG (*FICUS CARICA* L.) 'ROXO DE VALINHOS' PLANTS

CHRYSTIANE BORGES FRÁGUAS[a], MOACIR PASQUAL[ac], LEONARDO FERREIRA DUTRA[a], and JAIRO OSVALDO CAZETTA[b]

[a]Departamento de Agricultura, Universidade Federal de Lavras – UFLA, Caixa Postal 37, CEP 37.200-000, Lavras-MG, Brazil

[b]Departamento de Tecnologia, Faculdade de Ciências Agrárias e Veterinárias – Unesp, Via de Acesso Prof. Paulo Donato Castellane, s/n, CEP 14.884-900, Jaboticabal-SP, Brazil

[c]Author to whom correspondence should be addressed: mpasqual@ufla.br

Abstract

An *in vitro* protocol for *Ficus carica* cv. 'Roxo de Valinhos' was optimized. Nodal explants containing two buds were excised from field-grown mature plants, and transferred to different proliferation media consisting of combinations of distinct concentrations of activated charcoal with benzyladenine (BA), kinetin with gibberellic acid (GA_3), and WPM (woody plant medium) with kinetin. The regular strength of WPM in combination with 0.5 mg l^{-1} kinetin was the best condition for shoot proliferation of *Ficus carica* 'Roxo de Valinhos' plants. The addition of activated charcoal in the medium completely inhibited shoot proliferation. The inclusion of BA in the medium induced excessive callus formation as well as small and vitrified shoots, while GA_3 induced excessive elongation associated with vitrification, chlorosis, and tip-burned shoots.

Received: September 23, 2003; **Accepted:** March 31, 2004

Keywords: activated charcoal, growth regulators, shoot proliferation, tissue culture

References

Ahuja, A. 1985. *In vitro* shoot differentiation in *Eucalyptus citriodora* Hook: effect of activated charcoal. Indian J. For. 8:340–341.

Anagnostakis, S. L. 1974. Haploid plants from anthers of tobacco – enhancement with charcoal. Planta 115:281–283. CrossRef

Anjos Sobrinho, A., M. dos; Pasqual, P. D. Paiva, and O. de. 1998. Efeito de diferentes concentrações de BA sobre o desenvolvimento 'in vitro' de gemas apicais de figo. Congr. Bras. Frut. :347.

Arena, L. M E. and G. M. Pastur. 2001. 6-Benzylaminopurine and activated charcoal affect *in vitro* shoot morphogenesis of *Berberis buxifolia*. Rev. Fac. Agron. 21:41–47.

Barbosa, W., F. A. Campo-Dall'Orto, M. Ojima, F. P. Martins, V. Bovi, and J. L. Castro de. 1992. Produção de mudas da figueira 'Roxo de Valinhos' através da cultura *in vitro*. O Agronômico 44:6–18.

Beyl, C. A. 2000. Getting started with tissue culture – media preparation, sterile technique, and laboratory equipment. Plant tissue culture concepts and laboratory exercises 21–38. TrigianoR. N. GrayD. J. London. CRC Press.

Brum, G. R. Micropropagação da figueira (*Ficus carica* L.) 'Roxo de Valinhos'. M.Sc. thesis. University of Lavras, Brazil; 2001.

Campos, V. P. 1997. Nematóides na cultura da figueira. Inf. Agrop. 18:33–38.

Debergh, P. and L. V. Maene. 1984. Pathological and physiological problems related to *in vivo* culture of plants. Parasitica 40:69–75. CSA

Demiralay, A., Y. Yalcin-Mendi, Y. Aka-Kacar, S. Cetiner, U. Aksoy, L. Ferguson, and S. Hepaksoy. 1998. *In vitro* propagation of *Ficus carica* L. var. Bursa Siyahi through meristem culture. Acta Hort. 480:165–167.

Ebert, A., F. Taylor, and J. Blake. 1993. Changes of 6-benzylaminopurine and 2,4-dichlorophenoxyacetic acid concentrations in plant tissue culture media in the presence of activated charcoal. Plant Cell Tiss. Organ Cult. 33:157–162. CrossRef

FAO (Food and Agriculture Organization). http//www.fao.org (accessed April 28, 1998).

Ferreira, D. F. 2000. Análises estatísticas por meio do Sisvar para Windows versão 4.0. Reun. Anual Reg. Bras. Soc. Intern. Biom. 1:255–258.

Fridborg, G., M. Pedersen, L. Landstrom, and T. Eriksson. 1978. The effect of activated charcoal on tissue cultures: absorption of metabolites inhibiting morphogenesis. Physiol. Plant. 43:104–106. CrossRef

Gaspar, T. H., C. Penel, F. J. Castillo, and H. Greppin. 1985. A two-step control of basic and acid peroxidases and its significance for growth and development. Physiol. Plant. 64:418–423. CrossRef

Guerra, M. and R. M B. F L. Costa. 1987. da. Micropropagação da figueira 'Roxo de Valinhos', através da cultura de meristemas. Congr. Bras. Frut. :465–467.

Guerra, M. and W. Handro. 1988. Somatic embryogenesis and plant regeneration in embryo cultures of *Euterpe edulis* Mart (Palmae). Plant Cell Rep. 7:550–552. CrossRef

Gunver, G., E. Ertan, U. Aksoy, L. Ferguson, and S. Hepaksoy. 1998. A study on the propagation of figs by the tissue culture techniques. Acta Hort. 480:169–172.

Haelterman, R. and D. M. Docampo. 1994. *In vitro* propagation of mosaic-free fig (*Ficus carica* L.) cultivars, using thermotherapy and shoot tip cultures. Rev. Inv. Agrop. 25:15–22.

Hazra, S., A. Kulkarni, A. Banerjee, A. B. Dhage, D. C. Agrawal, K. V. Krishnamurthy, and S. M. Nalawade. 2002. A rapid and simple method for *in vitro* plant regeneration from split embryo axes of six cultivars of cotton. Biol. Plant. 45:317–319. CrossRef

Jona, R. and I. Gribaudo. 1987. Adventitious bud formation from leaf explants of *Ficus lyrata*. HortScience 22:651–653.

Jordan, M. and L. Iturriaga. 1980. Formación de raices en entrenudos de higuera (*Ficus carica* L. cv. Adriatic) cultivados *in vitro*. Ciencia Inv. Agri. 7:149–151.

Kadota, M., K. Imizu, and T. Hirano. 2001. Double-phase in vitro culture using sorbitol increases shoot proliferation and reduces hyperhydricity in Japanese pear. Sci. Hort. 89:207–215. CrossRef

Kumar, V., A. Radha, and S. K. Chita. 1998. *In vitro* plant regeneration of fig (*Ficus carica* L. cv. Gular) using apical buds from mature trees. Plant Cell Rep. 17:717–720. CrossRef, CSA

Leshem, B., E. Werker, and D. P. Shalev. 1988. The effect of cytokinins on vitrification in melon and carnation. Ann. Bot. 62:271–276.

Mishra, M., R. Saxena, R. K. Pathak, and A. K. Srivastava. 1999. Studies on micropropagation of aonla (*Emblica officinalis* Gaertn). Progr. Hort. 31:116–122.

Murashige, T. and F. Skoog. 1962. A revised medium for rapid growth and bioassays with tobacco tissue cultures. Physiol. Plant. 15:473–497. CrossRef

Murithi, M., T. Ragan, and B. H. Waite. 1982. *In vitro* propagation of fig through shoot tip culture. HortScience 17:86–87.

Nobre, J., A. Romano, U. Aksoy, L. Ferguson, and S. Hepaksoy. 1998. *In vitro* cloning of *Ficus carica* L. adult trees. Acta Hort. 480:161–164.

Pan, M. and J. Staden. 1998. van. The use of charcoal in *in vitro* culture – a review. Plant Growth Regul. 26:155–163. CrossRef

Pasqual, M. 2001. Meios de cultura 74. Lavras, Brazil. UFLA/FAEPE.

Pereira, A. M S., B. W. Bertoni, R. M. Moraes, and S. C. Franca. 2000. Micropropagation of *Salix humboldtiana* Hild. Ver. Bras. Plan. Med. 2:17–21.

Pontikis, C. and P. Melas. 1986. Micropropagation of *Ficus carica* L. HortScience 21:153–154.

Ribeiro, I. J A. 1999. Doenças da figueira. Cultura da figueira – do plantio à comercialização 151–164. CorrêaL. S. de. BolianiA. C. Ilha Solteira. FAPESP.

Webb, D., B. S. Flinn, and W. Georgis. 1988. Micropropagation of eastern white pine (*Pinus strobus* L.). Can. J. Forest Res. 18:1570–1580. CrossRef

Youmbi, E. and A. Benbadis. 2001. Régénération *in vitro* de plants à partir des bourgeons axillaries et de l'apex de plantules sexuées de *Dacryodes edulis* (Don) Lam. Fruits 56:333–343. CrossRef

Ziv, M. 1991. Vitrification: morphological and physiological disorders of *in vitro* plants. Micropropagation – technology and application 45–79. DeberghP. C. ZimmermanR. H. Dordrecht. Kluwer Academic Publishers.

Fig 1. Shoots per explant (*A*) and shoot length (*B*) as a function of the levels of BA in the culture medium.

enlarge figure

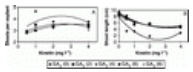


Fig 2. Shoots per explant (*A*) and shoot length (*B*) as a function of the levels of kinetin and GA_3 (mg l^{-1}) in the culture medium.

enlarge figure

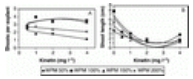
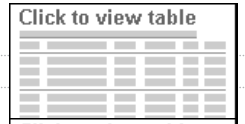


Fig 3. Shoots per explant (*A*) and shoot length (*B*) as a function of the levels of kinetin and medium strength.

enlarge figure

TABLE 1 RESULTS OBTAINED FROM THE ANALYSIS OF VARIANCE, *F* TEST, OF SHOOTS PER EXPLANT AND SHOOT LENGTH AS A FUNCTION OF THE LEVELS OF BA IN THE CULTURE MEDIUM



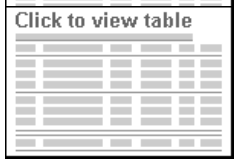


TABLE 2 RESULTS OBTAINED FROM THE ANALYSIS OF VARIANCE, *F* TEST, OF SHOOTS PER EXPLANT AS A FUNCTION OF THE LEVELS OF KINETIN AND GA_3 IN THE CULTURE MEDIUM

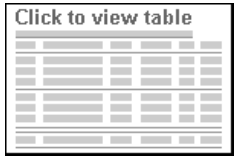


TABLE 3 RESULTS OBTAINED FROM THE ANALYSIS OF VARIANCE, *F* TEST, OF SHOOT LENGTH AS A FUNCTION OF THE LEVELS OF KINETIN AND GA_3 IN THE CULTURE MEDIUM

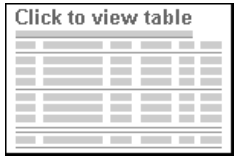


TABLE 4 RESULTS OBTAINED FROM THE ANALYSIS OF VARIANCE, *F* TEST, OF SHOOTS PER EXPLANT AS A FUNCTION OF THE LEVELS OF KINETIN AND WPM STRENGTH IN THE CULTURE MEDIUM

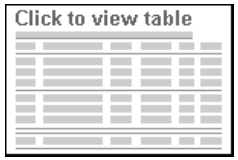


TABLE 5 RESULTS OBTAINED FROM THE ANALYSIS OF VARIANCE, *F* TEST, OF SHOOT LENGTH AS A FUNCTION OF THE LEVELS OF KINETIN AND WPM STRENGTH IN THE CULTURE MEDIUM

(editor W. Y. Soh)