

**POLYAMINES AFFECT THE MORPHOGENESIS OF *IN VITRO* CULTURED  
CHRYSANTHEMUM AND TOBACCO**

**Jaime A. Teixeira da Silva**

Faculty of Agriculture, Kagawa University, Miki-cho, Kagawa, 761-0795, Japan, Telfax: + 81 87 891 0747  
E-mail: jaimetex@angelfire.com

**REFERENCES**

- Altamura M. M., Capitani F., Cerchia R., Falasca G., Bagni N. (1993). Cytological events induced by the inhibition of polyamine biosynthesis in thin cell layers of tobacco. *Protoplasma*, 175: 9-16.
- Berta G., Altamura M. M., Fusconi A., Cerruti F., Capitani F., Bagni N. (1997). The plant cell wall is altered by inhibition of polyamine biosynthesis. *New Phytologist*, 137: 569-577.
- Brutti C., Apostolo N. M., Ferrarotti S. A., Llorente B. E., Krymkiewicz N. (2000). Micropropagation of *Cynara scolymus* L. employing cyclodextrins to promote rhizogenesis. *Scientia Horticulturae*, 83: 1-10.
- Chriqui D., D'Orazi D., Bagni N. (1986). Ornithine and arginine decarboxylases and polyamine involvement during *in vivo* differentiation and *in vitro* dedifferentiation of *Datura innoxia* leaf explants. *Physiologia Plantarum*, 68: 589-596.
- da Silva J. A. T. (2001). Chrysanthemum organogenesis through thin cell layer technology and plant growth regulator control. 28th Annual Meeting of the Plant Growth Regulation Society of America, Miami, Florida, U.S.A., July 3-6, p. 45 (abst.).
- Eberhard S., Doubrava N., Marfá V., Mohnen D., Southwick A., Darvill A., Albersheim P. (1989). Pectic cell wall fragments regulate tobacco thin-cell-layer explant morphogenesis. *The Plant Cell*, 1: 747-755.
- Evans P. T., Malmberg R. L. (1989). Do polyamines have roles in plant development? *Annual Review of Plant Physiology*, 223: 117-143.
- Feirer R. P., Mingnon G., Litray J. D. (1984). Arginine decarboxylase and polyamines required for embryogenesis in the wild carrot. *Science*, 233: 1433-1435.
- Fukai S., Chen Z., Oe M. (1987). Cultivar differences in adventitious shoot formation from leaf segments of chrysanthemum (*Dendranthema grandiflora* (Ramat.) Kitamura). *Bulletin of the Osaka Agricultural Research Center*, 24: 55-58.
- Galston A. W., Kaur-Sawhney R. (1995). Polyamines as endogenous growth regulators. *In: Davies P. J. (Ed.) Plant hormones: physiology, biochemistry and molecular biology*, 2nd ed. Kluwer Academic Publishers: 158-178.
- Gendy C., Tiburcio A. F., Tran Thanh Van K. (1992). Control of plant growth and development. *Acta Horticulturae*, 323: 261-267.
- Heby O. (1981). Role of polyamines in the control of cell proliferation and differentiation. *Differentiation*, 19: 1-20.
- Jarvis B. C., Shannon, P. R. M., Yasmin S. (1983). Involvement of polyamines with adventitious root development in stem cuttings of mung bean. *Plant Cell Physiology*, 24: 677-683.
- Jarvis B. C., Yasmin S., Coleman M. (1985). RNA and protein metabolism during adventitious root formation in stem cuttings of *Phaseolus aureus* cultivar berkin. *Physiologia Plantarum*, 64: 53-59.
- Kakkar R. K., Rai V. R. (1987). Effects of spermine and IAA on carbohydrate metabolism during rhizogenesis in *Phaseolus vulgaris*. 1. Hypocotyl cuttings. *Indian Journal of Experimental Botany*, 25: 476-478.
- Kaur-Sawhney R., Tiburcio A. F., Galston A. W. (1988). Spermidine and flower bud differentiation in thin layer tobacco tissue culture. *Planta*, 173: 282-284.
- Le B. V., Nhut D. T. (2000). Thin cell layer morphogenesis in ornamental species. *In: Chadha K. L., Ravindran P. N., Sahijram L. (Eds.) Biotechnology in horticultural and plantation crops*. Malhotra Publishing: 137-182.
- Mariani P., D'Orazi D., Bagni N. (1989). Polyamines in primary walls of carrot cells: endogenous content and interactions. *Journal of Plant Physiology*, 135: 508-510.

- Nag S., Saha K., Choudhuri M. A. (1999). Role of auxin and polyamines in adventitious root formation at the base of mung bean cuttings. *Indian Journal of Plant Physiology*, 4: 247-253.
- Pua E. C., Deng X., Koh A. T. C. (1999). Genotypic variability of *de novo* shoot morphogenesis of *Brassica oleracea* *in vitro* in response to ethylene inhibitors and putrescine. *Journal of Plant Physiology*, 155: 598-605.
- Rajasekaran L. R., Blake T. J. (1998). Early growth invigoration of jack pine seedlings by natural plant growth regulators. *Trees*, 12: 420-423.
- Scholten H. J. (1998). Effect of polyamines on the growth and development of some horticultural crops in micro-propagation. *Scientia Horticulturae*, 77: 83-88.
- Serafini-Fracassini D., Bagni N., Cionini P. G., Bennici A. (1980). Polyamines and nucleic acids during the first cell cycle of *Helianthus tuberosus* tissue after the dormancy break. *Planta*, 148: 332-337.
- Simola L. K., Honkanen J. (1983). Organogenesis and fine structure in megagametophyte callus lines of *Picea abies*. *Physiologia Plantarum*, 59: 551-561.
- Smith T. A. (1985). Polyamines. *Annual Review of Plant Physiology*, 36: 117-143.
- Spaink H. P., Lugtenberg B. J. J. (1994). Role of rhizobial lipo-chitin oligosaccharide signal molecules in root nodule organogenesis. *Plant Molecular Biology*, 26: 1413-1422.
- Tiburcio A. F., Gendy C. A., Tran Thanh Van K. (1989). Morphogenesis in tobacco subepidermal cells: putrescine as marker of root differentiation. *Plant Cell Tissue and Organ Culture*, 19: 43-54.
- Torrigiani P., Altamura M. M., Pasqua G., Monacelli B., Serafini-Fracassini D., Bagni N. (1987). Free and conjugated polyamines during *de novo* floral and vegetative bud formation in thin cell layers of tobacco. *Physiologia Plantarum*, 70: 453-460.
- Tran Thanh Van K. (1973). Direct flower neoformation from superficial tissues of small explant of *Nicotiana tabacum* L. *Planta*, 115: 87-92.
- Tran Thanh Van K., Toubart P., Cousson A. (1985). Manipulation of the morphogenetic pathways of tobacco explants by oligosaccharins. *Nature*, 314: 615-617.
- Van Overbeek J., Gordon S., Gregory L. (1946). Analysis of the function of the leaf in the process of root formation in cuttings. *American Journal of Botany*, 33: 100-107.
- Walden R., Cordeiro A., Tiburcio A. F. (1997). Polyamines: small molecules triggering pathways in plant growth and development. *Plant Physiology*, 113: 1009-1013.
- Zabotina O., Gurjanov O. P., Ibragimova N. N., Ayupova D. A., Lozovaya V. V. (1998). Rhizogenesis in buckwheat thin cell layer explants: Effect of plant oligosaccharides. *Plant Science*, 135: 195-201.