

**SOMATIC EMBRYOGENESIS INDUCTION FROM *IN VITRO* LEAF CULTURES OF LISIANTHUS
(*EUSTOMA GRANDIFLORUM* (RAF.) SHINN.)**

**Duong Tan Nhut^{1*}, Nguyen Si Tuan², Hua My Ngoc², Phan Nha Uyen¹, Nguyen Trinh Don¹,
Nguyen Thanh Mai², and Jaime A. Teixeira da Silva³**

¹Da Lat Institute of Biology, 116 Xo Viet Nghe Tinh, Da Lat, Lam Dong, Vietnam,
*Tel.: +84-63-831056, *Fax: +84-63-831028, *E-mail: duongtannhut@gmail.com

²Open University of Ho Chi Minh City, 97 Vo Van Tan, Dist. 3, Ho Chi Minh City, Vietnam

³Faculty of Agriculture, Kagawa University, Miki-cho, Ikenobe, Kagawa-ken, 761-0795, Japan

REFERENCES

- Ammirato P. V. (1983). Embryogenesis. *In*: Evans D. A., Sharp W. R., Ammirato P. V., and Yamada Y. (Eds.). Handbook of plant cell culture. Vol. 1, Macmillan, New York, USA: 82.
- Arcioni A., Davey M. R., Dos Santos A. V. P., Cocking E. C. (1982). Somatic embryogenesis in tissues from mesophyll and cell suspension protoplasts of *Medicago coerulea* and *M. glutinosa*. *Zeitschrift für Pflanzenphysiologie*, 106: 105.
- Evans D. A., Sharp W. R., Flick C. E. (1981). Growth and behavior of cell culture: embryogenesis and organogenesis. *In*: Thorpe T. A. (Ed.). Plant tissue culture: methods and applications in agriculture. Academic Press. New York, USA: 45-113.
- Furukawa H. (1993). Some characteristics of regenerated plants from leaf and root explants of *Eustoma grandiflorum*. *Plant Tissue Culture Letters*, 10 (1): 98-99.
- Furukawa H., Kishida K., Fukai S. (1988). Plant regeneration from leaf segments of Prairie Gentian (*Eustoma grandiflorum*). *Plant Tissue Culture Letters*, 5 (2): 96-97.
- Furukawa H., Matsubara C., Shigematsu N. (1990). Shoot regeneration from the roots of Prairie Gentian [*Eustoma grandiflorum* (Griseb.) Schinners]. *Plant Tissue Culture Letters*, 7 (1): 11-13.
- Kim S. W., Oh S. C., Liu J. R. (2003). Control of direct and indirect somatic embryogenesis by exogenous growth regulators in immature zygotic embryo cultures of rose. *Plant Cell, Tissue and Organ Culture*, 74: 61-66.
- Linsmaier E. M., Skoog F. (1965). Organic growth factor requirements of tobacco tissue cultures. *Physiologia Plantarum*, 18: 100-127.
- Liu Q. C., Zhai H., Lu D. H., Wang Y., Zhang D. P. (1997). An efficient system of embryogenic suspension cultures and plant regeneration in sweetpotato. *In Vitro Cellular and Developmental Biology–Plant*, 1997: 265-270.
- Marchant R., Davey M. R., Lucas J. A., Power J. B. (1996). Somatic embryogenesis and plant regeneration in floribunda rose (*Rosa hybrida* L.) cvs. Trumpeter and Glad Tidings. *Plant Science*, 120: 95-105.
- Merkle S. A., Parrott W. A., Flinn B. S. (1995). Morphogenic aspects of somatic embryogenesis. *In*: Thorpe T.A. (Ed.) *In vitro* embryogenesis in plants. Kluwer Academic Publishers. The Netherlands:155-203.
- Murashige T., Skoog F. (1962). A revised medium for rapid growth and bioassays with tobacco tissue cultures. *Physiologia Plantarum*, 15: 473-497.
- Nhut D. T., Le B. V., Minh N. T., da Silva J. A. T., Fukai S., Tanaka M., Van K. T. T. (2002). Somatic embryogenesis through pseudo-bulblet transverse thin cell layer of *Lilium longiflorum*. *Plant Growth Regulation*, 37: 193-198.
- Noriega C., So'ndahl M. R. (1991). Somatic embryogenesis in hybrid tea roses. *Biotechnology*, 9: 991-993.
- Paek K. Y., Hahn E. J. (2000). Cytokinins, auxins and activated charcoal affect organogenesis and anatomical characteristics of shoot-tip cultures of lisianthus [*Eustoma grandiflorum* (Raf.) Shinn.]. *In Vitro Cellular and Developmental Biology–Plant*, 36: 118-124.
- Pareek L. K., Chandra N. (1978). Somatic embryogenesis in leaf callus from cauliflower (*Brassica oleracea* var. Botrytis). *Plant Science Letters*, 11: 311.
- Park S. U., Facchini P. J. (1999). High-efficiency somatic embryogenesis and plant regeneration in California poppy, *Eschscholzia californica* Cham. *Plant Cell Reports*, 19: 421-426.

- Rout G. R., Debata B. K., Das P. (1991). Somatic embryogenesis in callus cultures of *Rosa hybrida* L. cv. Landora. *Plant Cell, Tissue and Organ Culture*, 27: 65-69.
- Ruffoni B., Damiano C., Massabo F., Esposito P. (1990). Organogenesis and embryogenesis in *Lisianthus russellianus* Hook. *ISHS Acta Horticulturae*, 280: I International Symposium on *In Vitro* Culture and Horticultural Breeding: 83-87.
- Sharma D. R., Deepak S., Chowdhury J. B. (1986). Regeneration of plantlets from somatic tissues of the date palm *Phoenix dactylifera* Linn. *Indian Journal of Experimental Biology*, 24: 763.
- Tuan N. S., Ngoc H. M., Mai N. T., Hai N. T., Nhut D. T. (2005) Shoot and root regeneration directly from culturing leaf segment of lisianthus (*Eustoma grandiflorum*) *in vitro*. *VAST Journal of Biotechnology*. (In Press)
- Yeung E. C. (1995). Structural and developmental patterns in somatic embryogenesis. *In*: Thorpe A. (Ed.). *In vitro* embryogenesis in plants. Kluwer Academic Publishers, The Netherlands: 205-247.