Propagation of Ornamental Plants
Vol. 10, № 4, 2010: 237-245

MICROPROPAGATION THROUGH SOMATIC EMBRYOGENESIS OF *CYCLAMEN PERSICUM* MILL. GENOTYPES FOR CUT FLOWER PRODUCTION – FEASIBILITY STUDY

Traud Winkelmann[1]*, Agnieszka Ilczuk[2], and Stephan Wartenberg[3]

[1]Institute of Floriculture and Woody Plant Science, Leibniz Universitaet Hannover,
Herrenhaeuser str. 2, D-30419 Hannover, Germany, *Fax: + 49 511 762 3608,
*E-mail: traud.winkelmann@zier.uni-hannover.de
[2]Department of Ornamental Plants, Faculty of Horticulture and Landscape Architecture,
Warsaw University of Life Science, 159 Nowoursynowska str., 02-776 Warsaw, Poland
[3]Saxon State Office for Environment, Agriculture and Geology, Department of Horticulture,
Dresden-Pillnitz, Soebrigener str. 3a, 01326 Dresden, Germany

REFERENCES

Bach A., Malik M., Zolneczko B. (1998). Organogenesis and somatic embryogenesis in cultures of *Cyclamen persicum* Mill. F_1 'Medium'. Acta Biologica Cracoviensia, Series Botanica, 40: 47-51.

Bian F., Zheng C., Qu F., Gong X., You C. (2010). Proteomic analysis of somatic embryogenesis in *Cyclamen persicum* Mill. Plant Molecular Biology Reporter, 28: 22-31.

Fukui H., Yamamoto T., Asano T., Nakamura M. (1988). Effect of plant growth regulators on *in vitro* organogenesis of cyclamen (*Cyclamen persicum* Mill.). Research Bulletin of the Faculty of Agriculture of Gifu University, 53: 139-145.

Hoenemann C., Richardt S., Krüger K., Zimmer A. D., Hohe A., Rensing S. A. (2010). Large impact pact of the apoplast on somatic embryogenesis in *Cyclamen persicum* offers possibilities for improved developmental control *in vitro*. BMC Plant Biology 10: 77 (http:// www.biomedcentral.com/1471-2229/10/77).

Kiviharju E., Tuominen U., Törmälä T. (1992). The effect of explant material on somatic embryogenesis of *Cyclamen persicum* Mill. Plant Cell, Tissue and Organ Culture, 28: 187-194.

Kreuger M., Postma E., Brouwer Y., van Holst G. J. (1995). Somatic embryogenesis of *Cyclamen persicum* in liquid medium. Physiologia Plantarum, 94: 605-612.

Lyngved R., Renaut J., Hausman J.-F., Iversen T.-H., Hvoslef-Eide A. K. (2008). Embryo-specific proteins *in Cyclamen persicum* analyzed with 2-D DIGE. Journal of Plant Growth Regulation, 27: 353-369.

Murashige T., Skoog F. (1962). A revised medium for rapid growth and bio assays with tobacco tissue cultures. Physiologia Plantarum, 15: 473-497.

Neumaier D., Bausbach E., Simon M., Tisch M., Winkelmann T. (2009). Effect of time of harvest, water quality and cut flower food on vase life of *Cyclamen* cut flowers. Acta Horticulturae, 847: 269-274.

Otani M., Shimada T. (1991). Somatic embryogenesis and plant regeneration from *Cyclamen persicum* Mill. leaf cultures. Plant Tissue Culture Letters, 8: 121-123.

Prange A. N. S., Serek M., Bartsch M., Winkelmann T. (2010a). Efficient and stable regeneration from protoplasts of *Cyclamen coum* Miller via somatic embryogenesis. Plant Cell, Tissue and Organ Culture, 101: 171-182.

Prange A. N. S., Bartsch M., Serek M., Winkelmann T. (2010b). Regeneration of different *Cyclamen* species via somatic embryogenesis from callus, suspension cultures and protoplasts. Scientia Horticulturae, 125: 442-450.

Püschel A.-K., Schwenkel H.-G., Winkelmann T. (2003). Inheritance of the ability for regeneration via somatic embryogenesis in *Cyclamen persicum* Mill. Plant Cell, Tissue and Organ Culture, 72: 43-51.

Rensing S. A., Lang D., Schumann E., Reski R., Hohe A. (2005). EST sequencing from embryogenic *Cyclamen persicum* cell cultures identifies a high proportion of transcripts homologous to plant genes involved in somatic embryogenesis. Journal of Plant Growth Regulation, 24: 102-115.

Schwenkel H.-G., Winkelmann T. (1998). Plant regeneration via somatic embryogenesis from ovules of *Cyclamen persicum* Mill. Plant Tissue Culture and Biotechnology, 4: 28-34.

Seyring M., Ewald A., Mueller A., Haensch K. T. (2009). Screening for propagation suitability *in vitro* of different *Cyclamen* species. Electronic Journal of Biotechnology 12 DOI: 10.2225/vol12-issue4-fulltext-7.

Takamura T., Tanaka M. (1996). Somatic embryogenesis from the etiolated petiole of cyclamen (*Cyclamen persicum* Mill.). Plant Tissue Culture Letters, 13: 43-48.

Takamura T., Miyajima I., Matsuo E. (1995). Somatic embryogenesis of *Cyclamen persicum* Mill. 'Anneke' from aseptic seedlings. Plant Cell Reports, 15: 22-25.

Wicart G., Mouras A., Lutz A. (1984). Histological study of organogenesis and embryogenesis in *Cyclamen persicum* tissue cultures: evidence for a single organogenetic pattern. Protoplasma, 119: 159-167.

Winkelmann T. (2010). Clonal propagation of *Cyclamen persicum* via somatic embryogenesis. *In*: Jain S. M., Ochatt S. J. (Eds). Protocols for *in vitro* propagation of ornamental plants. Vol. 589, Methods in Molecular Biology. Springer-Verlag Berlin, Heidelberg: 281-290.

Winkelmann T., Serek M. (2005). Genotypic differences in callus formation and regeneration of somatic embryos in *Cyclamen persicum* Mill. Euphytica, 144: 109-116.

Winkelmann T., Heintz D., Van Dorsselaer A., Serek M., Braun H.-P. (2006). Proteomic analyses of somatic and zygotic embryos of *Cyclamen persicum* Mill. reveal new insights into seed and germination physiology. Planta, 224: 508-519.

Winkelmann T., Prange A. N. S., Specht J., Serek M. (2008). Morphological characterization of plants regenerated from protoplasts of *Cyclamen persicum* Mill. Propagation of Ornamental Plants, 8: 9-12.