

**IN VITRO BULBLET REGENERATION FROM
SCILLA SIBERICA HAW. SUBSP. ARMENA (GROSSH.) MORDAK PEDUNCLE**

Fethi Ahmet Ozdemir^{1*}, Mehmet Ugur Yildirim², Mahsa Pourali Kahriz³, and Omer Kilic⁴

¹Department of Molecular Biology and Genetics, Faculty of Science and Art, 1 Kultur str., Bingol University, 12100 Bingol, Turkey, *Fax: + 4262 160 022, *E-mail: ozdemirfethiahmet23@yahoo.com

²Department of Field Crops, Faculty of Agriculture and Natural Sciences, Usak University, 1 Eylul Campus, 64200 Usak, Turkey

³Department of Field Crops, Faculty of Agriculture, Ankara University, Diskapi, 06110 Ankara, Turkey

⁴Technical Science Vocational College, Bingöl University, 12100 Bingol, Turkey

REFERENCES

- ARSLAN N., GURBUZ B., GUMUSCU A., OZCAN S., MIRICI S., KHAWAR K. M. (2002). Cultivation of *Sternbergia fischeriana* (Herbert) Rupr. and a study on its morphological characteristics. *Pakistan Journal of Botany*, 34: 411-418.
- BANGANI V., CROUCH N. R., MULHOLLAND D. A. (1999). Homoisoflavonones and stilbenoids from *Scilla nervosa*. *Phytochemistry*, 51: 947-951.
- DAVIS P. H. (1984). *Flora of Turkey and East Aegean Islands*, 8, University Press, Edinburgh, 650 pp.
- DEUMLING B., CLERMONT L. (1989). Changes in DNA content and chromosomal size during cell culture and plant regeneration of *Scilla siberica*: selective chromatin diminution in response to environmental conditions. *Chromosoma*, 97: 439-448.
- GEORGE M. W., TRIPEPI R. R. (2004). Micropropagation of *Lewisia cotyledon* using axillary buds from flower peduncles. *Native Plants Journal*, 5: 175-180.
- HUETTEMAN C. A., PREECE J. E. (1993). Thidiazuron: a potent cytokinin for woody plant tissue culture. *Plant Cell, Tissue and Organ Culture*, 33: 105-119.
- HUSSEY G. (1977). *In vitro* propagation of some members of Liliaceae, Iridaceae and Amaryllidaceae. *Acta Horticulturae*, 78: 303-309.
- İPEK A., ÇOÇU S., URANBEY S., KAYA D., GÜRBÜZ B., ASLAN N., SANCAK C., ÖZCAN S. (2009). *In vitro* bulblet production from immature embryos of ornamental plant *Ornithogalum platyphyllum* Boiss. *Research Journal of Biotechnology*, 4: 21-25.
- KAMANO Y., PETTIT G. R. (1974). Steroids and related natural products bufadienolides synthesis of scillarenin. *Journal of Organic Chemistry*, 39: 2629-2631.
- KIZIL S., KHAWAR K. M., ALTUNTAS C., SAGLAM S. (2014). Direct bulblet regeneration from *Sternbergia fischeriana* (Herb.) Rupr. bulb scale explants. *Propagation of Ornamental Plants*, 14: 68-75.
- LANGENS-GERRITS M., ALBERS M., DE KLERK G. J. (1998). Hotwater treatment before tissue culture reduces initial contamination in *Lilium* and *Acer*. *Plant Cell, Tissue and Organ Culture*, 52: 75-77.
- LEE S. M., CHUN H. K., LEE C. H., MIN B. S., LEE E. S., KHO Y. H. (2002). Eucosterol oligoglycosides isolated from *Scilla scilloides* and their anti-tumor activity. *Chemical and Pharmaceutical Bulletin*, 50: 1245-1249.
- MALABADI R. B., VAN STADEN J. (2004). Regeneration of *Ornithogalum in vitro*. *South African Journal of Botany*, 70: 618-621.
- MIMAKI Y., ORI K., SASHIDA Y., NIKAIKO T., SONG L. G., OHMOTO T. (1999). Peruvianosides A and B, novel triterpen glycosides from the bulbs of *Scilla peruviana*. *Bulletin of the Chemical Society of Japan*, 366: 1182-1186.
- MIREK Z., PIĘKOŚ-MIRKOWA H., ZAJĄC A., ZAJĄC M. (2002). Flowering plants and pteridophytes of Poland. A checklist. W. Szafer Institute of Botany. Polish Academy of Sciences, Kraków, 442 pp.
- MORDAK E. V. (1984). *Scilla* L. In: Davis P. H. (Ed.). *Flora of Turkey and the East Aegean Islands*. Edinburgh University Press. 8: 214-224.
- MURASHIGE T., SKOOG F. (1962). A revised medium for rapid growth and bioassays with tobacco tissue cultures. *Physiologia Plantarum*, 15: 473-497.
- MUTANYATTA J., MATAPA B. G., SHUSHU D. D., ABEGAZ B. M. (2003). Homoisoflavonoids and xanthenes from the tubers of wild and *in vitro* regenerated *Ledebouria graminifolia* and cytotoxic activities of some of the homoisoflavonoids. *Phytochemistry*, 62: 797-804.
- NASIRCILAR A., MIRICI S., KARAGÜZEL Ö., EREN Ö., BAKTIR I. (2011). *In vitro* propagation of endemic and endangered *Muscari mirum* from different explant types. *Turkish Journal of Botany*, 35:37-43.
- NHUT D. T., VINH H. T. M., BINH N. V., LUAN V. Q. (2012). Thin cell layer technology in regeneration and micropropagation of *Cyclamen persicum* Mill. *Propagation of Ornamental Plants*, 12: 89-95.
- OZDEMIR F. A., YILDIRIM M. U., POURALI KAHRIZ M. (2014). Efficient micropropagation of highly economic, medicinal and ornamental plant *Lallemantia iberica* (Bieb.) Fisch. and C. A. Mey. *BioMed Research International*, 2014, Article ID: 476346, 5 pp.
- OZDEMIR F. A., YILDIRIM M. U., POURALI KAHRIZ P. (2015). Micropropagation of endemic *Scutellaria orientalis* L. subsp. *bicolor* using modified MS medium & TDZ. *Emirates Journal of Food and Agriculture*, 27: 1-7.
- OZEL C. A., KHAWAR K. M. (2007). *In vitro* bulblet regeneration of *Ornithogalum oligophyllum* E. D. Clarke using twin scale bulb explants. *Propagation of Ornamental Plants*, 2: 82-88.
- OZEL C. A., KHAWAR K. M., KARAMAN S., ATEŞ M. A., ARSLAN O. (2008). Efficient *in vitro* multiplication in *Ornithogalum ulophyllum*

- Hand.-Mazz. from twin scale explants. *Scientia Horticulturae*, 116: 109-112.
- OZEL A., ERDEN K. (2010). Determination of capacity to produce marketable bulb and morphological characteristics of some exported geophytes. *Harran University Journal of Faculty of Agriculture*, 14: 90-99.
- OZEL C. A., KHAWAR K. M., UNAL F. (2015). Factors affecting efficient *in vitro* micropropagation of *Muscari muscarimi* Medikus using twin bulb scale. *Saudi Journal of Biological Sciences*, 22: 132-138.
- PAEK K. Y., MURTHY H. N. (2002). High frequency of bulblet regeneration from bulb scale sections of *Fritillaria thunbergii*. *Plant Cell, Tissue and Organ Culture*, 68: 247-252.
- SATIL F., AKAN H. (2006). Anatomical investigation of some endemic and rare geophytes of family Liliaceae. *Ekoloji*, 58: 21-27 (in Turkish).
- SHIM J. S., KIM J. H., LEE J., KIM S.N., KWON H. J. (2004). Anti-angiogenic activity of the homoisoflavanone from *Cremastra appendiculata*. *Planta Medica*, 70: 171-173.
- SILAYO A., NGADJUI A., ABEGAZ B. M. (1999). Homoisoflavonoids and stilbenes from the bulbs of *Scilla nervosa* subsp. *rigidifolia*. *Phytochemistry*, 52: 947-955.
- SNEDECOR G. W., COCHRAN W. G. (1989). *Statistical methods*. Iowa State University Press, Ames, Iowa, USA, 8th edition, 491 pp.
- SUH J., LEE W., LEE A. (2005). New plantlet proliferation and bulbing promotion *in vitro* cultures of *Ornithogalum* hybrid. *Acta Horticulturae*, 683: 155-163.
- URANBEY S. (2010). Stimulating effects of different basal media and cytokinin types on regeneration of endemic and endangered *Muscari aucheri*. *Archives of Biological Sciences*, 62: 663-667.
- URANBEY S., İPEK A., ÇALIŞKAN M., DÜNDAR E., ÇÖÇÜ S., BAŞALMA D., GÜNEYLIOĞLU H. (2010). *In vitro* bulblet induction from bulb scales of endangered ornamental plant *Muscari azureum*. *Biotechnology and Biotechnological Equipment*, 24: 1843-1848.
- YEO E. J., KIM K. T., HAN Y. S., NAH S. Y., PAIK H. D. (2006). Antimicrobial, anti-inflammatory, and anti-oxidative activities of *Scilla scilloides* (Lindl.) Druce root extract. *Food Science and Biotechnology*, 15: 639-642.
- YILDIRIM M. U. (2013). Micropropagation of *Origanum acutidens* (Hand.-Mazz.) Ietswaart using stem node explants. *The Scientific World Journal*, 2013: 1-3.
- ZIV M., LILLIEN-KIPNIS H. (2000). Bud regeneration from inflorescence explants for rapid propagation of geophytes *in vitro*. *Plant Cell Reports*, 19: 845-850.