

MICROPROPAGATION OF ORNAMENTAL PLANTS - CUT FLOWERS

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REFERENCES

- Ahmed K. Z., Sagi F. (1993). Use of somaclonal variation and *in vitro* selection for induction of plant disease resistance: prospects and limitations. *Acta Phytopathology and Entomology of Hungary*, 28: 143-159.
- Ahloowalia B. S. (1992). *In vitro* radiation induced mutants in *Chrysanthemum*. *Mutation Breeding News Letter*, 39: 6.
- Aitkens-Christie J. (1991). Automation. *In: Debergh P. C., Zimmerman R. H. (Eds.). Micropropagation technology and application. Kluwer Academic Publishers, The Netherlands: 363-388.*
- Aitken-Christie J., Kozai T., Takayama S. (1995). Automation in plant tissue culture: General introduction and overview. *In: Aitken-Christie J., Kozai T., Smith M. A. L. (Eds.), Automation and environmental control in plant tissue culture. Kluwer Academic Publishers, The Netherlands: 1-18.*
- Anandhi S., Sekar K. (2000). Studies on *in vitro* plantlet production in *Gladiolus* cv. Friendship. *Indian Journal of Horticulture*, 57 (4): 360-363.
- Arnold N. P., Binns M. R., Cloutier C. D., Barthakur N. N., Pellerin R. (1995). Auxins, salt concentrations and their interactions during *in vitro* rooting of winter-hardy and hybrid Tea roses. *HortScience*, 30 (7): 1436-1440.
- Arene L., Pellegrino C., Gudín S. (1993). A comparison of the somaclonal variation level of *Rosa hybrida* cv. Meirutral plants regenerated from callus or direct induction from different vegetative and embryonic tissues. *Euphytica*, 71: 83-92.
- Arditti J. (1977). Clonal propagation of orchids by means of tissue culture. *In: Arditti J. (Ed.). Orchid Biology: Review and Perspectives. Cornell University Press, New York, USA: 467-520.*
- Aswath C., Choudhary M. L. (2001). Effect of cytokinins on proliferation of multiple shoots in gerbera (*Gerbera jamesonii*). *Indian Journal of Horticulture*, 58 (4): 383-386.
- Aswath C., Choudhary M. L. (2002). Mass propagation of gerbera (*Gerbera jamesonii* cv. AV101). *Indian Journal of Horticulture*, 59 (1): 95-99.
- Babu P., Chawla H. S. (2000). *In vitro* regeneration and *Agrobacterium* mediated transformation in gladiolus. *Journal of Horticultural Science and Biotechnology*, 75 (4): 400-404.
- Bajaj Y. P. S. (1986). *In vitro* preservation of genetic resources. *In: Nuclear techniques and in vitro culture for plant improvement. Proceedings of International Symposium, 19-23 rd August, I.A.E.A., Vienna, Austria: 43-57.*
- Bajaj Y. P. S. (Ed.). (1990). *Biotechnology in Agriculture and Forestry. Vol. 11. Somaclonal variation in crop improvement. Springer-Verlag, Berlin, 678 pp.*
- Bajaj Y. P. S., Sidhu M. M. S., Gill A. P. S. (1983). Some factors affecting the *in vitro* propagation of *Gladiolus*. *Scientia Horticulturae*, 18: 269-275.
- Begum A. A., Takami M., Kako S. (1994). Formation of protocorm-like bodies (PLB) and shoot development through *in vitro* culture of outer tissue of *Cymbidium* PLB. *Journal of Japanese Society of Horticultural Science (Japan)*, 63 (3): 663-673.
- Belarmino M. M., Gabon C. F. (1999). Low cost micropropagation of chrysanthemum (*Chrysanthemum morifolium*) through tissue culture. *Philippine Journal of Science*, 128 (2): 125-143.
- Belarmino M. M., Mii M. (2000). *Agrobacterium*-mediated genetic transformation of a *Phalaenopsis* orchid. *Plant Cell Reports*, 19 (5): 435-442.
- Ben-Meir H., Scovel G., Ovadis M., Vainstein A. (1997). Molecular markers in the breeding of ornamentals. *Acta*

- Horticulturae, 447: 599-601.
- Benetka V. (1985). Some experiences of methodology with the isolation of somatic mutations in the rose cultivar 'Sonia'. *Acta Pruboniana*, 50: 9-25.
- Bhojwani S. S., Razdan M. K. (Eds.) (1996). *Plant Tissue Culture: Theory and Practice* (revised edition). Elsevier, Amsterdam, The Netherland, 473 pp.
- Blakesley D., Lenton J. R., Horgan R. (1991). Uptake and metabolism of 6-benzylaminopurine in shoot cultures. *Physiologia Plantarum*, 81: 343-348.
- Bouman H., Kuijpers A. M., de Klerk G. J. (1992). The influence of tissue culture methods on somaclonal variation in *Begonia*. *Physiologia Plantarum*, 85: A45.
- Bouman H., de Klerk G. J. (1996). Somaclonal variation in biotechnology of ornamental plants. *In: Geneve R., Preece J., Merkle S. (Eds.). Biotechnology of ornamental plants*. CAB International, UK: 165-183.
- Bressan P. H., Kim Y. J., Hyndman S. E., Hasegawa P. M., Bressan R. A. (1982). Factors affecting *in vitro* propagation of rose. *Journal of American Society of Horticultural Science*, 107 (6): 979-990.
- Broertjes C., Van Harten A. M. (Eds.) (1978). *Application of mutation breeding methods on the improvement of vegetatively propagated crops*. Elsevier Science. Publisher, The Netherlands, 325 pp.
- Broertjes C., VanHarten A. M. (Eds.) (1988). *Applied mutation breeding for vegetatively propagated crops*. *In: Developments in Crop Science, Vol. 12*, Elsevier Science Publishers, Amsterdam: 197-204.
- Carelli B. P., Echeverrigaray S. (2002). An improved system for the *in vitro* propagation of rose cultivars. *Scientia Horticulturae*, 92 (1): 69-74.
- Chartier-Hollis J. M., Harris W., Lynch P. T., Morisot A., Ricci P. (1996). Cryopreservation of shoot tips of *Rosa multiflora*. *Acta Horticulturae*, 424 : 367-368.
- Chen J. T., Chang W. C. (2000). Plant regeneration via embryo and shoot bud formation from flower-stalk explants of *Oncidium Sweet Sugar*. *Plant Cell, Tissue and Organ Culture*, 62: 65-100.
- Chen J. T., Chang C., Chang W. C. (1999). Direct somatic embryogenesis on leaf explants of *Oncidium gower Ramsey* and subsequent plant regeneration. *Plant Cell Reports*, 19: 143-149.
- Chakrabarty D., Mandal A. K., Datta S. K. (2000). *In vitro* propagation of rose cultivars. *Indian Journal of Plant Physiology*, 5 (2): 189-192.
- Cho M. S., Valmayor H. L. (1988). Effects of culture media on the growth of seedlings derived from embryo culture in *Paphiopedilum philippinense* (Tropical orchid). *Korean Journal of Plant Tissue Culture*, 15: 103-110.
- Choudhary M. L. (1991). Vegetative propagation of carnation *in vitro* through multiple shoot development. *Indian Journal of Horticulture*, 18: 177-181.
- Choudhary M. L., Chin C. K., Polashock J. J., Martin C. E. (1994). *Agrobacterium* mediated transformation of *Petunia hybrida* with yeast Δ -9 fatty acid desaturase. *Plant Growth Regulators*, 15: 113-116.
- Choudhary M. L., Kokchin C. (1995). Somatic embryogenesis in cell suspension culture of carnation (*Dianthus caryophyllus* L.). *Plant Growth Regulators*, 16: 1-4.
- Chu C. Y., Knight S. L., Smith M. A. L. (1993). Effect of liquid culture on the growth and development of miniature rose (*Rosa chinensis* Jacq. 'Minima'). *Plant Cell, Tissue and Organ Culture*, 32: 329-334.
- Cornish E. C., Baudinette Sc., Graham M. W., Stevenson K. R., White E. L. J., Michael M. Z., Lu C., Chandler S. F., Savin K. W. (1991). Expression of antisense ethylene forming enzyme in transgenic carnation (*Dianthus caryophyllus*). 31st Annual General Meeting of the Australian Society of Plant Physiologists. Australian National University, 2 – 4th October, 1991, Abstract No. 65.
- Das P., Rout G. R., Das A. B. (1993). Somatic embryogenesis in callus culture of *Mussaenda erythrophylla* cvs. Queen Sirikit and Rosea. *Plant Cell, Tissue and Organ Culture*, 35:199-201.
- Dalsou V., Short K. C. (1987). Selection of sodium chloride tolerance in *Chrysanthemum*. *Acta Horticulturae*, 212: 737-740.
- Datta S. K., Chakrabarty D., Saxena M., Mandal A. K. A., Biswas A. K. (2001). Direct shoot generation from florets of chrysanthemum cultivars. *Indian Journal of Genetics and Plant Breeding*, 61 (4): 373-376.
- Debener T., Mattiesch L. (1996). Genetic analysis of molecular markers crosses between diploid roses. *Acta Horticulturae*, 424: 249-252.
- Debener T., Bartels C., Spethmann W. (1997). Parentage analysis in interspecific crosses between rose species with RAPD markers. *Gartenbauwissenschaft*, 62: 180-184.
- de Jong J., Rademaker W., van Wordragen M. P. (1993). Restoring adventitious shoot formation of *Chrysanthemum* leaf explants following co-cultivation with *Agrobacterium tumefaciens*. *Plant Cell, Tissue and Organ Culture*, 32: 263-270.
- de Wit J. C., Esendam H. F., Horkanen J. J., Tuominen U. (1990) Somatic embryogenesis and regeneration of flowering plants in rose. *Plant Cell Reports*, 9: 456-458.

- Douglas G. C., Rutledge C. B., Casey A.D., Richardson D. H. S. (1989). Micropropagation of floribunda ground cover and miniature roses. *Plant Cell, Tissue and Organ Culture*, 19: 55-64.
- Earle E. D., Langhans R. W. (1975). Carnation propagation for shoot tips cultured in liquid medium. *HortScience*, 10: 608-610.
- Elliott E. F. (1970). Axenic culture of meristem tips of *Rosa multiflora*. *Planta*, 95: 183-186.
- Elomaa P., Honkanen J., Puska R., Seppanen P., Helariutta Y., Mehto M., Kotilainen M., Nevalainen L., Teeri T. H. (1993). *Agrobacterium*-mediated transfer of antisense chalcone synthase cDNA to *Gerbera hybrida* inhibits flower pigmentation. *Bio/Technology*, 11: 508-511.
- Firoozabady E., Noriega C., Sondahl M. R., Robinson K. E. P. (1991a). Genetic transformation of rose (*Rosa hybrida* cv. Royalty) via *Agrobacterium tumefaciens*. *In Vitro*, 27: 154A.
- Firoozabady E., Lemieux C. S., Moy Y. S., Moll B., Nicholas J. A., Robinson K. E. P. (1991b). Genetic engineering of ornamental crops. *In vitro*, 27: 96A.
- Firoozabady E., Moy Y., Courtneygutterson N., Robinson K. (1994). Regeneration of transgenic rose (*Rosa hybrida*) plants from embryogenic tissue. *Biotechnology*, 12: 609-613.
- Firoozabady E., Moy Y., Tucker W., Robinson K., Gutterson N. (1995). Efficient transformation and regeneration of carnation cultivars using *Agrobacterium*. *Molecular Breeding*, 1: 283-293.
- Frey L., Saranga Y., Janick Y. (1992). Somatic embryogenesis in carnation. *HortScience*, 27: 63-65.
- Fu F. M. L. (1979). Studies on the tissue culture of orchids. II. Clonal propagation of *Aranda*, *Ascocenda*, *Cattleya* by leaf tissue culture. *Orchid Reviews*, 87: 343-346.
- Fukai S., Morii M., Oe M. (1988). Storage of *Chrysanthemum (Dendratherema grandiflorum* Ramat.) plantlets *in vitro*. *Plant Cell, Tissue and Organ Culture*, 5: 20-25.
- Fukai S., Oe M. (1990). Morphological observations of *Chrysanthemum* shoot tips cultured after cryoprotection and freezing. *Journal of Japanese Society of Horticultural Science*, 59: 383-387.
- Ghashghaie J., Brenckmann F., Saugier B. (1991). Effect of agar concentration on water status and growth of rose plants cultured *in vitro*. *Physiologia Plantarum*, 82 (1): 73-78.
- Ghosh S., Mohan Ram H. Y. (1986). Multiplication of spray-carnations by axillary bud culture. *Currunt Science*, 55 (19): 966-971.
- Graves A. C. F., Goldman S. L. (1987). *Agrobacterium tumefaciens*-mediated transformation of the monocot genus *Gladiolus*: Detection of expression of T-DNA-encoded genes. *Journal of Bacteriology*, 169: 1745-1746.
- Griesbach R. J. (1992). Incorporation of the GUS gene into orchids through embryo electrophoresis. *HortScience*, 27: 620.
- Gudin S., Mouchotte J. (1996). Integrated research in rose improvement. A breeder's experience. *Acta Horticulturae*, 424: 285-292.
- Hackett W. P., Anderson J. M. (1967). Aseptic multiplication and maintenance of differentiated carnation shoot tissue derived from shoot apices. *Proceedings of American Society of Horticultural Science*, 90: 365-369.
- Haccius B. (1978). Question of unicellular origin of non-zygotic embryos in callus cultures. *Phytomorphology*, 28: 74-81.
- Haberlandt G. (1902). Kulturversuche mit isolierten pflanzenzellen. *S. B. Weisen Wien Naturwissenschaften*, 111:69-92.
- Hasegawa P. M. (1979) *In vitro* propagation of rose. *HortScience*, 14: 610-612.
- Hasegawa P. M. (1980). Factors affecting shoot and root initiation from cultured rose shoot tips. *Journal of American Society of Horticultural Science*, 105 (2): 216-220.
- Heslot H. (1968). Mutation research done in 1967 on barley, roses and marigold. *Mutations in Plant Breeding*. II, IAEA, Vienna, Austria: 153-159.
- Hedtrich C. M. (1979). Sprossregeneration aus Blättern und Vermehrung von *Gerbera jamesonii*. *Gartenbauwissenschaft*, 44: 1-3.
- Hempel M., Petos-Witkowska B., Tymoszuk J. (1985). The influence of cytokinins on multiplication and subsequent rooting of *Gerbera in vitro*. *Acta Horticulturae*, 157: 301-304.
- Hitmi A., Barthomeuf C., Sallanon H. (2000). Cryopreservation of *Chrysanthemum cinerariaefolium* shoot tips. *Journal of Plant Physiology*, 156: 408-412.
- Horn W. A. H. (1992). Micropropagation of rose. *In: Bajaj Y. P. S. (Ed.). Biotechnology in Agriculture and Forestry*, Vol. 4. SpringerVerlag, Germany: 320-342.
- Hohe A., Winkelmann T., Schwenkel H. G. (1999). The effect of oxygen partial pressure in bioreactors on cell proliferation and subsequent differentiation of somatic embryos of *Cyclamen persicum*. *Plant Cell, Tissue and Organ Culture*, 59 (1): 39-45.
- Hsia C. N., Korban S. S. (1996). Organogenesis and somatic embryogenesis in callus cultures of *Rosa hybrida*

- and *Rosa chinensis-minima*. *Plant Cell, Tissue and Organ Culture*, 44 (1): 1-6.
- Huang M. C., Chu C. Y. (1985). A scheme for commercial multiplication of *Gerbera* (*Gerbera hybrida* Hort.) through shoot tip culture. *Journal of Japanese Society of Horticultural Science*, 54 (1): 94-100.
- Huang S. C., Tsai C. C., Sheu C. S. (2000). Genetic analysis of *Chrysanthemum* hybrids based on RAPD molecular markers. *Botanical Bulletin of Academia Sinica*, 41 (4): 257-262.
- Huitema J. B. M., Gussenhoven G., Dons J. J. M., Broertjes C. (1986). Induction and selection of low-temperature tolerant mutants of *Chrysanthemum morifolium* Ramat. *Nuclear Techniques and In vitro Culture Plant Improvement*, IAEA, Vienna, Austria: 321-327.
- Hussey G. (1975). Totipotency in tissue explants and callus of some members of the Liliaceae, Iridaceae and Amaryllidaceae. *Journal of Experimental Botany*, 26: 253-262.
- Hutchinson J. F., Miller R., Kaul V., StevenSon T., Richards D. (1989) Transformation of *C. Morifolium* based on *Agrobacterium* gene transfer. *Journal of Cellular Biochemistry*: 261 (Abstract).
- Hutchinson J. F., Kaul V., Maheswaran G., Moran J. R., Graham M. W., Richards D. (1992). Genetic improvement of floricultural crops using biotechnology. *Australian Journal of Botany*, 40: 765-787.
- Hvoslef-Eide A. K., Munster C. (1998). Somatic embryogenesis of *Cyclamen persicum* Mill. in bioreactors. *Combined Proceedings of International Plant Propagation*, 47: 377-382.
- Insook P., Weon K. K., Park I. S., Kim K. W (1999). Induction of multiple shoot from cormel tip of gladiolus 'Spic & Span'. *Journal of Korean Society of Horticultural Science*, 40 (2): 257-259.
- Intuwong O., Sagawa Y. (1973). Clonal propagation of *Sarcanthus* orchids by aseptic culture of inflorescences. *American Orchid Society Bulletin*, 42: 209-215.
- Jain S. M. (1993a). Somaclonal variation in *Begonia x elatior* and *Saintpaulia ionantha* L. *Scientia Horticulturae*, 54: 221-231.
- Jain S. M. (1993b). Studies on somaclonal variation in ornamental plants. *Acta Horticulturae*, 336: 365-372.
- Jain S. M. (1993c). Growth hormonal influence on somaclonal variation in ornamental plants. *Proceedings of XVII Eucarpia Symposium on Creating Genomic Variation in Ornamentals*: 93-103.
- Jain S. M. (1997). Somaclonal variation and mutagenesis for crop improvement. *Maatalouden tutkimuskeskuksen julkaisuja*, Vol.18, MTTK, Jokioinen, Finland: 122-133.
- Jain S. M., de Klerk G. J. (1998). Somaclonal variation in breeding and propagation of ornamental crops. *Plant Tissue Culture and Biotechnology*, 4 (2): 63-75.
- Jain S. M., Buiatti M., Gimelli F., Saccardo F. (1997). Somaclonal variation in improving ornamental plants. *In: Jain S. M., Brar D. S., Ahloowalia B. S. (Eds). Somaclonal variation and induced mutation in crop improvement. Kluwer Academic Publishers, The Netherlands: 81-105.*
- Jain S. M., Vitti D., Tucci M., Grassotti A., Rugini E., Saccardo F. (1998). Biotechnology and Agronomical aspects in gerbera improvements. *Advances in Horticultural Science*, 12: 47-53.
- Jain S. M. (2000). Mechanisms of spontaneous and induced mutations in plants. *Radiation Research*, 2: 255-258.
- Jain S. M. (2001). Tissue culture-derived variation in crop improvement. *Euphytica*. 118:153-166.
- Jain S. M. (2002). Feeding the world with induced mutations and biotechnology. *Proceedings of International Nuclear Conference 2002-Global trends and perspectives. Seminar 1: Agriculture and Bioscience. MINT, Bangi, Malaysia: 1-14.*
- Jain S. M., Brar D. S., Ahloowalia B. S. (Eds.) (2002). *Molecular techniques in crop improvement. Kluwer Academic Publishers, The Netherlands, 628 pp.*
- Jain S. M., Maluszynski M. (2003). Induced mutations and biotechnology in improving crops. *In: Mujib A. (Ed.). In vitro applications in crop improvement: Recent Progress. IBH-Oxford, India (in press).*
- Janakiram T. (2000). Planting material of ornamental crops: Present status and future prospects. *Floriculture Today*, October: 26-31.
- Jen Tsung C., Weichin C., Chen J. T., Chang W. C. (2000). Plant regeneration via embryo and shoot bud formation from flower-stalk explants of *Oncidium Sweet Sugar*. *Plant Cell, Tissue and Organ Culture*, 62 (2): 95-100.
- Jenes B., Morre H., Cao J., Zhang W., Wu R. (1993). Techniques for gene transfer. *In: Kung S., Wu R. (Eds.). Transgenic Plants. Vol.1, Academic Press, San Diego, USA: 125-146.*
- Kakehi M. (1978). Studies on tissue culture of carnation. V. Induction of redifferentiated plants from petal tissue. *Bulletin Hiroshima Agricultural College*, 6: 159-166.
- Kaicker U. S. (1982). Mutation breeding in roses. *India Rose Annual Report*, 2: 35-42.
- Kamo K. (1997). Factors affecting *Agrobacterium tumefaciens* mediated gusA expression and opine synthesis in *Gladiolus*. *Plant Cell Reports*, 16: 389-392.
- Kanjilal B., Datta K. B. (2000). Rapid micropropagation of *Geodorum densiflorum* (Lam.) Schltr. in liquid culture.

- Indian Journal Experimental Biology, 38 (11): 1164-1167.
- Kawata M., Oono K. (1997). Protoclonal variation in crop improvement. *In*: Jain S. M., Brar D. S., Ahloowalia B. S. (Eds.). Somaclonal variation and induced mutation for crop improvement. Kluwer Academic Publishers, The Netherlands: 135-148.
- Kerbaui G. B. (1984). Plant regeneration of *Oncidium varicosum* (Orchidaceae) by means of root tip culture. *Plant Cell Reports*, 3: 27-29.
- Kevers C., Boyer N., Courduroux J., Gaspar T. (1992). The influence of ethylene on proliferation and growth of rose shoot culture. *Plant Cell, Tissue and Organ Culture*, 28: 175-181.
- Khalid N., Davey M. R., Power J. B. (1989). An assessment of somaclonal variation in *Chrysanthemum morifolium*: the generation of plants of commercial value. *Scientia Horticulturae*, 38: 287-294.
- Khosh-Khui M., Sink K. C. (1982a). Micropropagation of new and old world rose species. *Journal of Horticultural Science*, 57 (3): 315-319.
- Khosh-Khui M., Sink K. C. (1982b). Callus induction and culture of *Rosa*. *Scientia Horticulturae*, 17: 361-370.
- Khosh-Khui M., Sink K. C. (1982c). Rooting enhancement of *Rosa hybrida* for tissue culture propagation. *Scientia Horticulturae*, 17: 371-376.
- Kim K. W., Kako S. (1984). Studies on clonal propagation in the *Cymbidium* floral organ culture *in vitro*. *Journal of Korean Society of Horticultural Science*, 25: 65-71.
- Kintzios S., Manos C., Makri O. (1999). Somatic embryogenesis from mature leaves of rose (*Rosa* spp.). *Plant Cell Reports*, 18 (6): 467-472.
- Knudson L. (1922). Flower production by orchid grown non-symbiotically. *Botanical Gazette*, 89: 192.
- Kozai T. (1990a). Autotrophic (sugar free) tissue culture for promoting the growth of plantlets *in vitro* and for reducing biological contamination. *Proceedings of International Symposium on Application of Biotechnology for Small Industries*, Bangkok, Thailand: 39-51.
- Kozai T. (1990b). Micropropagation under photoautotrophic conditions. *In*: Debergh P., Zimmerman R. H. (Eds.). *Micropropagation: Technology and Application*. Kluwer Academic Publishers, The Netherlands: 449-471.
- Kozai T. (1991a). Autotrophic micropropagation. *In*: Bajaj Y. P. S. (Ed.). *Biotechnology in Agriculture and Forestry*. Vol.17, High-tech and micropropagation I., Springer-Verlag, New York: 313-343.
- Kozai T. (1991b). Controlled environments in conventional and automated Micropropagation. *In*: Levin R., Vasil I. K. (Eds.). *Cell Culture and somatic cell genetics of plants*. Vol.8. Scale-up and automation in plant tissue culture. Academic Press Inc., London: 213-230.
- Kozai T., Kubota C., Watanabe I. (1988). Effect of basal medium composition on the growth of carnation plantlets in auto- and mixotrophic tissue culture. *Acta Horticulturae*, 230: 159-166.
- Kozai T., Kubota C., Watanabe I. (1990a). The growth of carnation plantlets *in vitro* cultured photoautotrophically and photomixotrophically on different media. *EnvironmentControl Biology*, 28: 21-27.
- Kozai T., Lee H., Hayashi M. (1990b). Photoautotrophic micropropagation of *Rosa* plantlets under CO₂ enriched and high photosynthetic photon flux conditions. Italy: Abstracts of 23rd International Horticultural Congress. I. Oral. International Society for Horticultural Science, Wageningen, The Netherlands: 173.
- Kuehnle A. R., Sugii N. (1992). Transformation of *Dendrobium* orchid using particle bombardment of protocorms. *Plant Cell Reports*, 11: 484-488.
- Kumar A., Sood A., Palni L. M. S., Gupta A. K. (1999). *In vitro* propagation of *Gladiolus hybridus* Hort.: Synergistic effect of heat shock and sucrose on morphogenesis-Micropropagation of *Gladiolus*. *Plant Cell, Tissue and Organ Culture*, 57: 105-112.
- Kumar A., Sood A., Palni U. T., Gupta A. K., Palni L. M. (2001). Micropropagation of *Rosa damascena* Mill. from mature bushes using thidiazuron. *Journal of Horticultural Science and Biotechnology*, 76 (1): 30-34.
- Kumar A., Palni L. M. S., Sood A., Sharma M., Palni U. T., Gupta A. K. (2002). Heat shock induced somatic embryogenesis in callus cultures of gladiolus in the presence of high sucrose. *Journal of Horticultural Science and Biotechnology*, 77 (1): 73-78.
- Kumari M., Varghese T. M., Mehta P. K. (2001). Micropropagation of chrysanthemum through shoot apex culture in two named varieties Viz. Miss Universe and Snow Ball. *Annual Agricultural Research*, 11 (3): 371-376.
- Kunitake H., Imamizo H., Mii H. (1993). Somatic embryogenesis and plant regeneration from immature seed-derived calli of rugosa rose (*Rosa rugosa* Thurb.). *Plant Science*, 90: 187-194.
- Labiberte S., Chretien L., Vieth J. (1985). *In vitro* plantlet production from young capitulum explants of *Gerbera jamesonii*. *HortScience*, 20: 137-139.
- Larkin P. J., Scowcroft W. R. (1981). Somaclonal variation - a novel source of variability from cell cultures for plant improvement. *Theoretical and Applied Genetics*, 60: 197-214.
- Langford P. J., Wainwright H. (1987). Effects of sucrose concentration on the photosynthetic ability of Rose

- shoots *in vitro*. *Annals of Botany*, 60: 633.
- Lee J. S., Shim K. K., Yoo M. S., Lee J. S., Kim Y. J. (1986). Studies on rhizome growth and organogenesis of *Cymbidium kanran* cultured *in vitro*. *Journal of Korean Society of Horticulture Science*, 27: 174-180.
- Le B. V., Hang-Phuong N. T., Anh Hong L. T., Tran Thanh Van K. (1999). High frequency shoot regeneration from *Rhynchostylis gigantean* (Orchidaceae) using thin cell layers. *Plant Growth Regulators*, 28 (3): 179-185.
- Ledger S. E., Deroles S. C., Given N. K. (1991). Regeneration and *Agrobacterium*-mediated transformation of *Chrysanthemum*. *Plant Cell Reports*, 10: 195-199.
- Lemieux C. S., Firoozabady E., Robinson K. E. P. (1990). *Agrobacterium*-mediated transformation of chrysanthemum. In: DeJong J. (Ed.). *Proceedings. Eucarpia Symposium on Integration of In vitro Techniques in Ornamental Plant Breeding*. Pudoc, Wageningen: 150-155.
- Levin R., Gaba V., Tal B., Hirsch S., Denola D., Vasil I. K. (1988). Automated plant tissue culture for mass propagation. *Biotechnology*, 6: 1035-1040.
- Lim S., Seon J. H., Paek K. Y., Son S. H., Han B. H., Drew R. A. (1998). Development of pilot scale process for mass production of *Lilium* bulblets *in vitro*. *Acta Horticulturae*, 461: 237-241.
- Li X. Q., Krasnyanski S. F., Korban S. S. (2002). Somatic embryogenesis, secondary somatic embryogenesis, and shoot organogenesis in *Rosa*. *Journal of Plant Physiology*, 159 (3): 313-319.
- Lloyd D., Roberts A. V., Short K. C. (1988). The induction *in vitro* of adventitious shoots in *Rosa*. *Euphytica*, 37: 31-36.
- Logan A. E., Zettler F. W. (1985). Rapid *in vitro* propagation of virus indexed *Gladioli*. *Acta Horticulturae*, 164: 169-180.
- Lowe J. M., Davey M. R., Power J. B., Blundy K. S. (1993). A study of some factors affecting *Agrobacterium* transformation and plant regeneration of *Dendratherma grandiflora* Tzvelev (Syn. *Chrysanthemum morifolium* Ramat.). *Plant Cell Tissue and Organ Culture*, 33: 171-180.
- Lu C., Nugent G., Wardley-Richardson T., Chandler S. F., Young R., Dalling M. J. (1991). *Agrobacterium*-mediated transformation of carnation (*Dianthus caryophyllus* L.). *Bio/Technology*, 9: 864-868.
- Maluszynski M., Ahloowalia B. S., Sigurbjornsson B. (1995). Application of *in vivo* and *in vitro* mutation techniques for crop improvement. *Euphytica*, 85: 303-315.
- Malaure R. S., Barclay G., Power J. B., Davey M. R. (1991). The production of novel plants from florets of *Chrysanthemum morifolium* using tissue culture. I. Shoot regeneration for ray florets and somaclonal variation exhibited by the regenerated plants. *Journal of Plant Physiology*, 139: 8-13.
- Mandal A. K. A., Chakrabarty D., Datta S. K. (2000). *In vitro* isolation of solid novel flower colour mutants from induced chimeric ray florets of chrysanthemum. *Euphytica*, 114: 9-12.
- Marchant R., Power J. B., Lucas J. A., Davey M. R. (1998a). Biolistic transformation of rose (*Rosa hybrida* L.). *Annals of Botany*, 81: 109-114.
- Marchant R., Davey M. R., Lucas J. A., Lamb C. J., Dixon R. A., Power J. B. (1998b). Expression of a chitinase transgene in rose (*Rosa hybrida* L.) reduces development of blackspot disease (*Diplocarpon rosae* Wolf.). *Molecular Breeding*, 4: 187-194.
- Martin C., Carre M., Vernoy R. (1981). La Multiplication Vegetative *in vitro* des vegetaux ligneux cultivees: Cas des Rosiers. *Comptes Rendues de li Academie des Sciences, Paris III*, 293: 175-177.
- Mathis N. L., Hinchey M. A. W. (1994). *Agrobacterium* inoculation techniques for plant tissues. In: Gelvin S. B., Schilperoort R. A. (Eds.). *Plant Molecular Biology Manual*, B6: 1-9, Kluwer Academic Publisher, The Netherlands: 350 pp.
- Matthews D., Mottley J., Horan I., Roberts A. V. (1991). A protoplast to plant system in roses. *Plant Cell, Tissue and Organ Culture*, 24: 173-180.
- May R. A., Trigiano R. N. (1991). Somatic embryogenesis and plant regeneration from leaves of *Dendratherma grandiflora*. *Journal of American Society of Horticulture Science*, 116: 366-371.
- Messeguer J., Arconada M. C., Mele E. (1993). Adventitious shoot regeneration in carnation (*Dianthus caryophyllus* L.) *Scientia Horticulturae*, 54: 153-163.
- Meynet J. (1983). Effects of *in vitro* propagation on the further growth behaviour of some *Gerbera* varieties. *Agronomie*, 3: 839-846.
- Micke A. (1999). Mutations in plant breeding. In: Siddiqui B. A., Khan S. (Eds.). *Breeding in Crop Plants – Mutations and in vitro Mutation Breeding*. Kalyani Publishers, New Delhi, India: 1-19.
- Mii M., Buiatti M., Gimelli F. (1989). Carnation. In: Evans D., Sharp W. R., Ammirato P., Yamada Y. (Eds.). *Handbook of Plant Cell Culture. Vol. 5, Ornamentals*. McGraw Hill Company, New York, USA: 284-318.
- Miller R. M., Kaul V., Hutchinson J. F., Richards D. (1991). Adventitious shoot regeneration in carnation (*Dianthus caryophyllus*) from axillary bud explants. *Annals of Botany*, 67: 35-42.

- Miyazachi S., Tashiro Y. (1977). Tissue culture of *Chrysanthemum morifolium* Ramat. II. Variation in chromosome number of plants regenerated from stem segments *in vitro*. Agriculture Bulletin of Saga University, 42: 27-42.
- Miyazachi S., Tashiro Y. (1978). Tissue culture of *Chrysanthemum morifolium* Ramat. II. Variation in chromosome number and flower colour of plants regenerated from different parts *in vitro*. Bulletin Shizuoka Agricultural Experimental Station, 44: 13-31.
- Modh F. K., Dhaduk B. K., Shah R. R. (2002). Factors affecting micropropagation of gerbera from capitulum explants. Journal of Ornamental Horticulture-New Series, 5 (1): 4-6.
- Morel G. (1964). Tissue culture: A new means of clonal propagation of orchids. American Orchid Society Bulletin, 33: 473-478.
- Murashige T. (1974). Plant propagation through tissue culture. Annual Review of Plant Physiology, 25: 135-166.
- Murashige T., Skoog F. (1962). A revised medium for rapid growth and bioassays with tobacco tissue cultures. Plant Physiology, 15: 473-497.
- Murashige T., Serpa M., Jones J. B. (1974). Clonal multiplication of *Gerbera* through tissue culture. HortScience, 9: 175-180.
- Nayak, N. R., Sahoo S., Patnaik S., Rath S. P. (2002). Establishment of thin cross section (TCS) culture method for rapid micropropagation of *Cymbidium aloifolium* (L.) Sw. and *Dendrobium nobile* Lindl. (Orchidaceae). Scientia Horticulturae, 94 (1-2): 107-116.
- Nikaido T., Onogawa Y. (1989). Establishment of a non-chimaeric flower colour mutation through *in vitro* cultures of florets from a sport on *Chrysanthemum* with special references to the genetic background of the mutation line obtained. Science Report of Faculty of Agriculture, Ibaraki University, 37: 63-69.
- Noriega C., Sondahl M. R. (1991). Somatic embryogenesis in hybrid tea roses. Bio/Technology, 9: 991-993.
- Novak F. J. C. (Ed.) (1991). *In vitro* mutation system for crop improvement. In: Plant Mutation Breeding for Crop Improvement. Vol.2, IAEA, Vienna, Austria: 327-342.
- Ohishi K., Sakurai Y. (1988). Morphological changes in *Chrysanthemum* derived from petal tissue. Research Bulletin Aichiken Agriculture Research Center, 20: 278-284.
- Orlikowska T., Nowak E., Marasek A., Kucharska D. (1999). Effects of growth regulators and incubation period on *in vitro* regeneration of adventitious shoots. Plant Cell, Tissue and Organ Culture, 59 (2): 95-102.
- Paek K. Y., Hahn E. J., Son S. H. (2001). Application of bioreactors for large-scale micropropagation systems of plants. In Vitro Cellular and Developmental. Biology- Plant, 37 (2): 149-157.
- Pathania N. S., Misra R. L., Raghava S. P. S. (2001). Precocious shoot proliferation and microcorm production in gladiolus through tissue culture. Journal of Ornamental Horticulture - New Series, 4 (2): 69-73.
- Pavingerova D., Dostal J., Biskova R., Benetka V. (1994). Somatic embryogenesis and *Agrobacterium*-mediated transformation of *Chrysanthemum*. Plant Science, 97: 95-101.
- Philip V. J., Nainar S. A. Z. (1986). Clonal propagation of *Vanilla planifolia* (Salisb.) Ames. using tissue culture. Journal of Plant Physiology, 122: 211-215.
- Pierik R. L. M., Steegmans H. H. M., Marelis J. J. (1973). *Gerbera* plantlets from *in vitro* cultivated capitulum explants. Scientia Horticulturae, 1: 117-119.
- Pierik L. M., Jansen J. L. M., Maasdam A., Binnendijk C. M. (1975). Optimization of *Gerbera* plantlets production from excised capitulum explants. Scientia Horticulturae, 3: 351-357.
- Prasad R. N., Sharma A. K., Chaturvedi H. C. (1983). Clonal multiplication of *Chrysanthemum morifolium* 'Otome zakura' in long-term culture. Bangladesh Journal of Botany, 12: 96-102.
- Prazak R., Horst W. J., Schenk M. K., Burkert A., Claassen N., Flessa H., Fromm W. B., Goldbach H., Olf H. W., Romheld V. (Eds) (2001). Influence of aluminium from AlCl₃ on differentiation and growth of *Dendrobium kingianum* Bidwill in *in vitro* conditions. In: Plant Nutrition: Food security and sustainability of Agro Ecosystems through basic and applied research. Fourteen International Plant Nutrition Colloquium, Hannover, Germany: 178-179.
- Preil W. (1991). Application of bioreactors in plant propagation. In: Debergh P. C., Zimmerman R. H. (Eds.). Micropropagation Technology and Application. Kluwer Academic Publishers, The Netherlands: 425-445.
- Preil W., Hoffmann M. (1985). *In vitro* storage in chrysanthemum breeding and propagation. In: Schafer-Menuhr A. (Ed.). *In Vitro* Techniques. Martinus Nijhoff, Dordrecht, The Netherlands: 161-165.
- Quatrano R. S. (1968). Freeze preservation of cultured flax cells utilising DMSO. Plant Physiology, 43: 2057-2061.
- Rajagopalan C. (2000). Export potential of Indian Floriculture and need of policy environment. Floriculture Today, September: 29-33.

- Rajapakse S., Hubbard M., Kelly J. W., Abbott A. G., Ballard R. E. (1992). Identification of rose cultivars by restriction fragment length polymorphism. *Scientia Horticulturae*, 52: 237-245.
- Rani V., Raina S. N. (1996). PCR technology. *Botanica*, 46: 78-81.
- Rani V., Raina S. N. (2000). Genetic fidelity of organized meristem-derived micropropagated plants: A critical reappraisal. *In Vitro Cellular and Developmental Biology-Plant*, 36: 319-330.
- Remotti P. C. (1995). Primary and secondary embryogenesis from cell suspension cultures of *Gladiolus*. *Plant Science*, 107: 205-214.
- Roberts A. V., Smith E. F. (1990). The preparation *in vitro* of chrysanthemum for transplantation to soil. I. Protection of roots by cellulose plugs. *Plant Cell Tissue and Organ Culture*, 21: 129-132.
- Roberts A. V., Horan I., Mathews D., Mottley J. (1990). Protoplast technology and somatic embryogenesis in *Rosa*. In: de Jong J. (Ed.). Integration of *in vitro* techniques in ornamental plant breeding. *Euphytica, Proceedings Symposium*, 10-14 Nov. CPO Centre for Plant Breeding Research, AA Wageningen, The Netherlands: 100-115.
- Roberts A. V., Walker S., Horan I., Smith E. F., Mottley J. (1992). The effects of growth retardants, humidity and lighting at stage III on stage IV of micropropagation in chrysanthemum and Rose. *Acta Horticulturae*, 319: 135-138.
- Roberts A. V., Yokoya K., Walker S., Mottley J. (1995). Somatic embryogenesis in *Rosa* spp. In: Jain S. M., Gupta P. K., Newton R. J. (Eds.). Somatic embryogenesis in woody plants. Vol. 2, Kluwer Academic Publishers, The Netherlands: 277-289.
- Robinson K. E. P., Firoozabady E. (1993). Transformation of Floriculture Crops. *Scientia Horticulturae*, 55: 83-99.
- Roest S., Bokelmann G. S. (1975). Vegetative propagation of *Chrysanthemum morifolium* Ram. *in vitro*. *Scientia Horticulturae*, 3: 317-330.
- Rogers R. M., Smith M. A. L. (1992). Consequences of *in vitro* and *ex vitro* root initiation for miniature rose production. *Journal of Horticultural Science*, 67: 535-540.
- Rotor G. Jr. (1949). A method for vegetative propagation of *Phalaenopsis* species and hybrids. *American Orchid Society Bulletin*, 18: 738-739.
- Rout G. R., Debata B. K., Das P. (1989). *In vitro* mass-scale propagation of *Rosa hybrida* cv. Landora. *Current Science*, 58 (15): 876-878.
- 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.
- Rout G. R., Palai S. K., Panday P., Das P. (1996). Direct plant regeneration of *Chrysanthemum morifolium* Ramat cv. Deep Pink: influence of explant source, age of explants, culture environment, carbohydrates, nutritional factors and hormone regime. *National Academy of Science India*, 67: 57-66.
- Rout G. R., Das P. (1997). Recent trends in the biotechnology of *Chrysanthemum*: a critical review. *Scientia Horticulturae*, 69: 239-257.
- Rout G. R., Samantaray S., Mottley J., Das P. (1999). Biotechnology of the rose: a review of recent progress. *Scientia Horticulturae*, 81: 201-228.
- Roy J., Banerjee N. (2002). Rhizome and shoot development during *in vitro* propagation of *Geodorum densiflorum* (Lam.) Schltr. *Scientia Horticulturae*, 94 (1-2): 181-192.
- Rutger J. N. (1992). Impact of mutation breeding in rice-a review. *Mutation Breeding Reviews*, 8: 1-24.
- Sakai A. (1960). Survival of the twigs of woody plants at -196°C. *Nature*, 185: 392-394.
- Sakamoto Y., Onishi N., Hirosawa T. (1995). Delivery systems for tissue culture by encapsulation. In: Christie J. A., Kozai T., Smith M. A. L. (Eds.). Automation and Environmental Control in Plant Tissue Culture. Kluwer Academic Publisher, The Netherlands: 215-243.
- Sallanon H., Maziere Y. (1992). Influence of growth room and vessel humidity on the *in vitro* development of rose plants. *Plant Cell, Tissue and Organ Culture*, 30: 121-125.
- Sarasan V., Roberts A. V., Rout G. R. (2001). Methyl laurate and 6-benzyladenine promote the germination of somatic embryos of a hybrid rose. *Plant Cell Reports*, 20 (3): 183-186.
- Schiva T. (2000) Floriculture production technology – an international perspective. In: Dadlani N. K. (Ed.). Strategies for development of commercial floriculture in Asia and the Pacific. Report of the APO seminar, New Delhi, India: 27-38.
- Scowcroft W. R., Larkin P. J. (1988). Somaclonal variation. In: Bock G., Marsh L. (Eds.). Applications of Plant Cell and Tissue Culture. CIBA Foundation Symposium. 137, Wiley Chichester: 21-35.
- Seon J. H., Kim Y. S., Son S. H., Paek K. Y., Van Plas L. H. W., de Klerk G. J. (2000). The fed-batch culture system using bioreactor for the bulblets production of Oriental lilies. *Acta Horticulturae*, 520: 53-59.
- Sen J., Sen S. (1995). Two step bud culture technique for a high frequency regeneration of *Gladiolus* corms.

- Scientia Horticulturae, 64: 133-138.
- Sheelavantmath S. S., Murthy H. N., Pyati A. N., Kumar H. G. A., Ravishankar B. V. (2000). *In vitro* propagation of the endangered orchid, *Geodorum densiflorum* (Lam.) Schltr. through rhizome section culture. *Plant Cell, Tissue and Organ Culture*, 60: 151-154.
- Sharma A. K., Mitra G. C. (1976). *In vitro* culture of shoot apical meristem of *Petunia hybrida* for mass production of plants. *Indian Journal of Experimental Biology*, 14: 348-350.
- Shoyama Y., Zhu X. X., Nakai R., Shiraishi S., Kohda H. (1997). Micropropagation of *Panax notoginseng* by somatic embryogenesis and RAPD analysis of regenerated plantlets. *Plant Cell Reports*, 6: 450-453.
- Short K. C., Roberts A. V. (1991). *Rosa* spp (Roses): *In Vitro* culture, micropropagation and production of secondary products. In: Bajaj Y. P. S. (Ed.). *Biotechnology in Agriculture and Forestry*. Vol. 15, Medicinal and Aromatic Plants. III, Springer-Verlag, Berlin: 376-397.
- Simonsen J., Hildebrandt A. C. (1971). *In vitro* growth and differentiation of *Gladiolus* plants from callus cultures. *Canadian Journal of Botany*, 49: 1817-1819.
- Singh S. K., Syamal M. M. (2000). Anti-auxin enhance *Rosa hybrida* L. micropropagation. *Biologia Plantarum*, 43 (2): 279-281.
- Singh S. K., Syamal M. M. (2001). A short pre-culture soak in thidiazuron or forchlorfenuron improves axillary shoot proliferation in rose micropropagation. *Scientia Horticulturae*, 91 (1/2): 169-177.
- Skirvin R. M., Janick J. (1976). Tissue culture induced variation in scented *Pelargonium* spp. *Journal of American Society Horticultural Science*, 101: 281-290.
- Skirvin R. M. (1978). Natural and induced variation in tissue culture. *Euphytica*, 27: 241-266.
- Skirvin R. M., Chu M. C. (1979). *In vitro* propagation of 'Forever Yours' rose. *HortScience*, 14 (5): 608-610.
- Skirvin R. M., Chu M. C. (1984). The effect of light quality on root development on *in vitro* grown miniature roses. *Hort Science*, 19: 575 (Abstract).
- Skirvin R. M., Chu M. C., Young H. J. (1990). Rose. In: Ammirato P. V., Evans D. R., Sharp W. R., Bajaj Y. P. S. (Eds.). *Handbook of Plant Cell Culture*. McGraw Hill Publisher Co., Vol. 5, Spinger Verlag, New York: 716-743.
- Skirvin R. M., Norton M., McPheeters K. D. (1993). Somaclonal variation: has it proved useful for plant improvement. *Acta Horticulturae*, 336: 333-340.
- Smart N. J., Fowler M. W. (1984). An airlift column bioreactor suitable for large scale cultivation of plant cell suspensions. *Journal of Experimental Botany*, 35: 531-537.
- Smilansky Z., Uniel N., Zieslin N. (1986). Mutagenesis in roses (cv. Mercedes). *Environment and Experimental Botany*, 26: 279-283.
- Soczek U., Hempel M. (1988). The influence of some organic medium compounds on multiplication of *Gerbera in vitro*. *Acta Horticulturae*, 226: 643-646.
- Steward F. C., Mapes M. O., Mears K. (1958). Growth and organised development of cultured cells. II. Organization in cultures grown from freely suspended cells. *American Journal of Botany*, 45: 705-707.
- Takayama S., Akita M. (1998). Bioreactor techniques for large-scale culture of plant propagules. *Advances in Horticulture Science*, 12: 93-100.
- Tanaka K., Kanno Y., Kudo S., Suzuki M. (2000). Somatic embryogenesis and plant regeneration in chrysanthemum (*Dendranthema grandiflorum*) (Ramat) Kitamura. *Plant Cell Reports*, 19: 946-953.
- Taurus T. E., Dunstan D. I. (1995). Scale-up of embryogenic plant suspension cultures in bioreactors. In: Jain S. M., Gupta P. K., Newton R. J. (Eds.). *Somatic embryogenesis in woody plants*, Vol.1, Kluwer Academic Publisher, The Netherlands: 265-269.
- Teng W. L., Nicholson L., Teng M. C. (1997). Micropropagation of *Spathoglottis plicata*. *Plant Cell Reports*, 16: 831-835.
- Topoonyanont N., Dillen W. (1988). Capitulum explants as a start for micropropagation of *Gerbera*: culture technique and applicability. *Mededelingen-van-de-Faculteit-Landbouwwetenschappen, Rijksuniversiteit-Gent*, 53 (1): 169-173.
- Tse A. T. Y., Smith R. J., Hackett W. P. (1971). Adventitious shoot formation of *Phalaenopsis* nodes. *American Orchid Society Bulletin*, 40: 807-810.
- Urban L. A., Sherman J. M., Moyer J. W., Daub M. E. (1992). Regeneration and *Agrobacterium* mediated transformation of *Chrysanthemum*. *In Vitro culture and Horticulture Breeding*, 28th June – 2nd July, 1992, Baltimore, MD: 49 (Abstract).
- Urban L. A., Sherman J. M., Moyer J. W., Daub M. E. (1994). High frequency shoot regeneration and *Agrobacterium* mediated transformation of *Chrysanthemum*. *Plant Science*, 98: 69-79.
- Van der Salm T. P. M., Van der Toorn C. J. G., Hanischten Cate C. H., Dons H. J. M. (1996). Somatic embryogenesis and shoot regeneration from excised adventitious roots of the root stock *Rosa hybrida* cv. Money Way.

- Plant Cell Reports, 15: 522-526.
- Vainstein A., Ben-Meir H., Zuker A., Watad A. A., Scovel G., Ahroni A., Ovadis M. (1995). Molecular markers and genetic transformation in the breeding of ornamentals. *Acta Horticulturae*, 420: 65-67.
- Van Wordragen M., Ouwerkerk P. B. F., Dons H. J. M. (1992). *Agrobacterium rhizogenes* mediated induction of apparently untransformed roots and callus in *Chrysanthemum*. *Plant Cell, Tissue and Organ Culture*, 30: 149-157.
- Vasil I. K. (1994). Automation of plant propagation. *Plant Cell, Tissue and Organ Culture*, 39: 105-108.
- Vij S. P., Sood A., Plaha K. K. (1984). Propagation of *Rhynchosyilis retusa* Bl. (Orchidaceae) by direct organogenesis from leaf segment cultures. *Botanical Gazette*, 145: 210-214.
- Votruba R., Kodyteck K. (1988). Investigation of genetic stability in *Chrysanthemum morifolium* 'Blanche Poitevine Supreme' after meristem culture. *Acta Horticulturae*, 226: 311-319.
- Walther F., Sauer A. (1986). *In Vitro* mutagenesis in roses. *Acta Horticulturae*, 189: 37-46.
- Wang S.O., Ma S. S. (1978). Clonal multiplication of *Chrysanthemum in vitro*. *Journal of Agricultural Association of China*, 32: 64-73.
- Wising K., Schell J., Kahl G. (1988). Foreign genes in plants: transfer, structure, expression and applications. *Annual Review of Genetics*, 22: 421-497.
- Wilfret G. J. (1971). Shoot tip culture of *Gladiolus*: Anevaluation of nutrient media for callus tissue development. *Proceedings of Florida State Horticultural Society*, 84: 389-393.
- Williams J. G. K., Kubelik A. R., Livak K. J., Rafalski I. A., Tingey S. V. (1990). DNA polymorphisms amplified by arbitrary primers are useful as genetic markers. *Nucleic Acids Research*, 18: 6531-6535.
- Woltering E. J. (1990). Beneficial effects of carbon dioxide on development of gerbera and rose plantlets grown *in vitro*. *Scientia Horticulturae*, 44: 341-345.
- Woodson W. R., Goldsbrough P. B. (1989). Genetic transformation of carnation using *Agrobacterium tumefaciens*. *HortScience*, 24: 80.
- www.iaea.org. Web site of International Atomic Energy Agency Organization.
- Yantcheva A., Vlahova M., Antanassov A. (1998). Direct somatic embryogenesis and plant regeneration of carnation (*Dianthus caryophyllus* L.). *Plant Cell Reports*, 18 (1/2): 148-153.
- Yang J., Lee H. J., Shin D. H., Oh S. K., Seon J. H., Paek K. Y., Han K. H. (1999). Genetic transformation of *Cymbidium* orchid by particle bombardment. *Plant Cell Reports*, 18: 978-984.
- Young P. S., Murthy H. N., Yoeup P. K. (2000). Mass multiplication of protocorm-like bodies using bioreactor system and subsequent plant regeneration in *Phalaenopsis*. *Plant Cell, Tissue and Organ Culture*, 63: 67-72.
- Zakharova I. K. (1987). Effect of nutrient media on the morphogenesis of gerbera *in vitro*. *Nauchnye-Trudy-Moskovskii-Lesotekhnicheskii-Institut*, 188: 72-75.
- Ziv M. (1970). Transplanting *Gladiolus* plants propagated *in vitro*. *Scientia Horticulturae*, 11: 257-260.
- Ziv M. (1979). Enhanced shoot and cormlet proliferation in liquid cultured *Gladiolus* buds by growth retardants. *Plant Cell, Tissue and Organ Culture*, 17: 101-110.
- Ziv M. (1990a). The effect of growth retardants on shoot proliferation and morphogenesis in liquid cultured gladiolus plants. *Acta Horticulturae*, 280: 207-214.
- Ziv M. (1990b). Morphogenesis of gladiolus buds in bioreactors-implication for scaled-up propagation of genotypes. *In: Nijkamp H. J. J., Van der Plas L. H. W., Van Atrijk J. (Eds.). Progress in Plant Cellular and Molecular Biology. Kluwer Academic Publishers, The Netherlands: 119-124.*
- Ziv M. (1991). Morphogenic patterns of plants micropropagated in liquid medium in shaken flasks or large-scale bioreactor cultures. *Israel Journal of Botany*, 40: 145-153.
- Ziv M. (1992). Morphogenetic control of plants micropropagated in bioreactor cultures and its possible impact on acclimatization. *Acta Horticulturae*, 319: 119-124.
- Ziv M. (1995). The control of bioreactor environment for plant propagation in liquid culture. *Acta Horticulturae*, 393: 25-38.
- Ziv M. (1999). Organogenic plant regeneration in bioreactors. *In: Altman A., Ziv M., Izhar S. (Eds.). Plant Biotechnology and in vitro biology in the 21st Century. Kluwer Academic Publishers, The Netherlands: 673-676.*
- Ziv M. (2000). Bioreactor Technology for Plant Micropropagation. *In: Janick J. (Ed.). Horticultural Reviews, Vol. 24, John Wiley & Sons Inc., New York: 1-30.*
- Ziv M., Lilien-Kipnis H. (2000). Bud regeneration from inflorescence explants for rapid propagation of genotypes *in vitro*. *Plant Cell Reports*, 19 (9): 845-850.
- Ziv M., Kipnis L. (1990). *Gladiolus*. *In: Ammirato P. V., Evans D. A., Sharp W. R., Bajaj Y. P. S. (Eds.). Hand Book of Plant Cell Culture. Vol. 5, Mac Millan, New York: 461-678.*
- Ziv M., Lilien-Kipnis H., Borochoy A., Halevy A. H. (1997). Bud cluster proliferation in bioreactor cultures of *Ornithogalum dubium*. *Acta Horticulturae*, 430: 307-310.

