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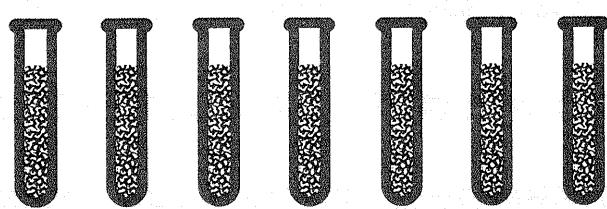
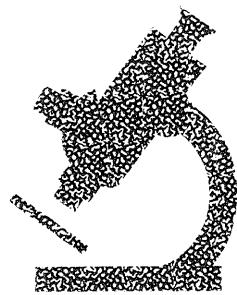
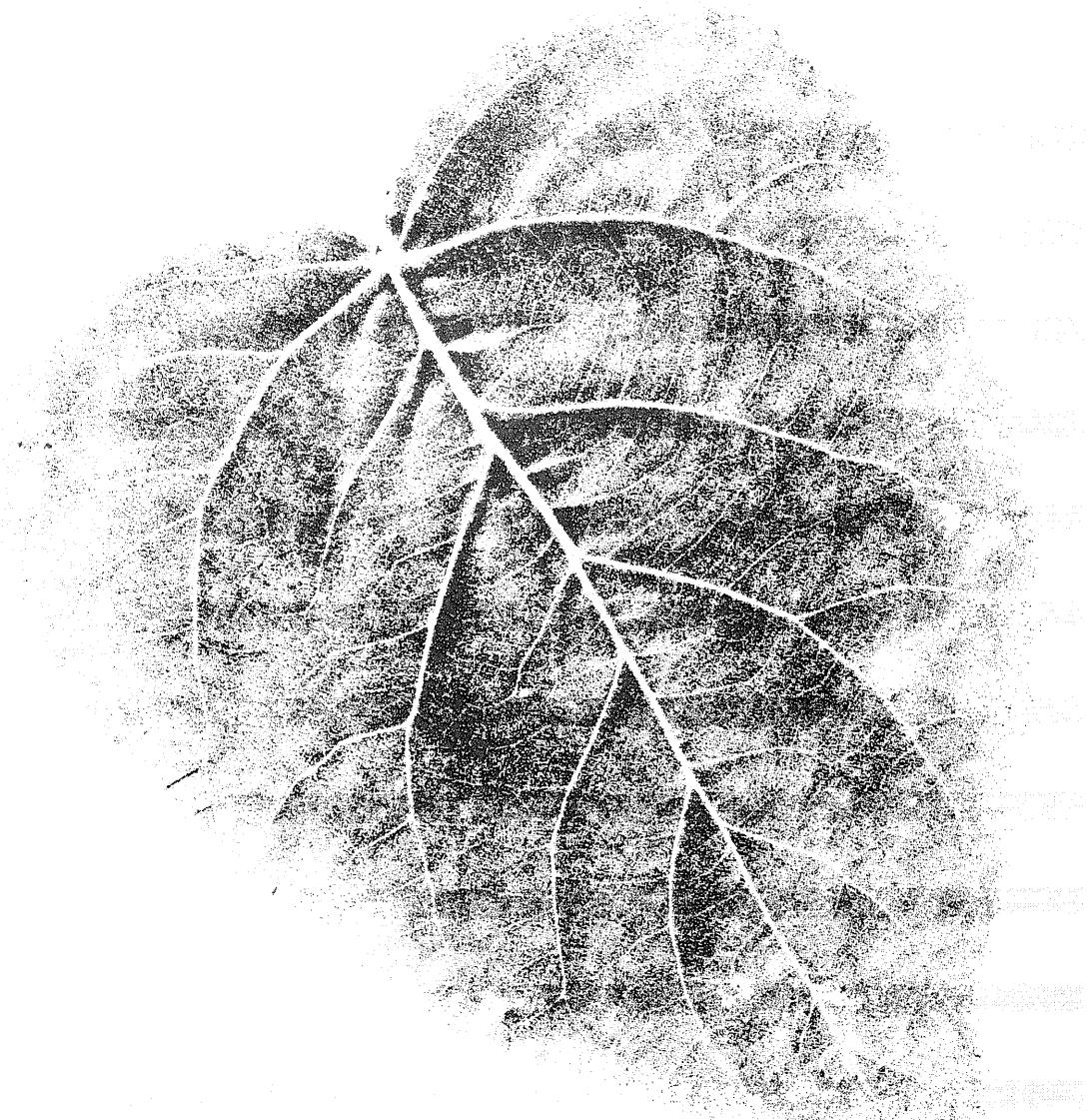
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Bibliography of *Populus* Cell and Tissue Culture

M. E. Ostry and K. T. Ward



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Bibliography of *Populus* Cell and Tissue Culture

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INTRODUCTION

Cell and tissue culture techniques are increasingly being applied to *Populus* species and their hybrids. Poplars have been used as a model species in the rapidly expanding field of forest tree biotechnology; the number of published reports has increased greatly in recent years (fig. 1). The predominant reason for the focus on poplars is the need for plant regeneration techniques in successful biotechnological applications. Nearly all *in vitro* culture and regeneration techniques can be applied to members of the genus *Populus*, unlike most other forest trees.

This bibliography is intended to serve as an international reference for literature covering poplar research ranging from clonal micropropagation to genetic transformation.

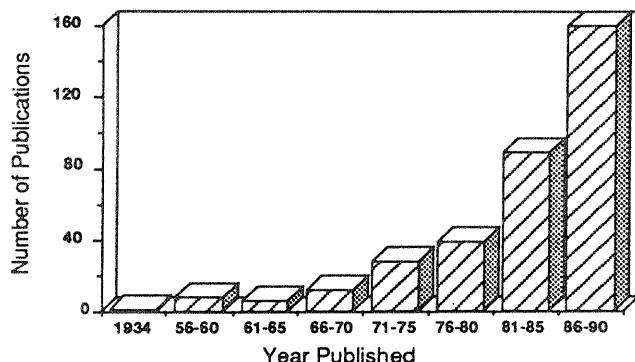


Figure 1.—Number of research papers on *Populus* cell and tissue culture published from 1934 to 1990.

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The search of major computerized literature data bases and other sources of literature citations was completed in January 1991. All citations available from 1990 at publication time are included; however, because of the time lag between publication and availability of abstracts, other citations may be available at a later date.

Citations are arranged by subject area and alphabetically by author. An author index is included.

MICROPROPAGATION

Ahuja, M.R. 1983. **Somatic cell differentiation and rapid clonal propagation of aspen.** *Silvae Genetica*. 32(3-4): 131-135.

Ahuja, M.R. 1985. **Regenerative potential of aspen tissues.** In: *Advances in agricultural biotechnology*. Dordrecht, The Netherlands: Martinus Nijhoff Publishers. 14: 187.

Ahuja, M.R. 1986. **Aspen.** In: Evans, D.A.; Sharp, W.R.; Ammirato, P.V., eds. *Handbook of plant cell culture*. New York, NY: Macmillan Publishing Company; London, England: Collier Macmillan Publishing. 4: 626-651.

Ahuja, M.R. 1987. **In vitro propagation of poplar and aspen.** *Cell and tissue culture in forestry*. Dordrecht, The Netherlands: Martinus Nijhoff Publishers: 3: 207-223.

Anonymous. 1977. **Interaction of auxin and kinetin on the organ differentiation of *Populus* callus tissue.** *Acta Botanica Sinica*. 19(1): 95-97.

- Badia, Nkanka. 1981. **Obtention de plantules à partir de bourgeons adventifs sur feuilles de peuplier ('Serotina de Champagne' - 'I 214') cultivés *in vitro*.** In: Touzet, G., ed. Proceedings, Colloque international sur la culture "in vitro" des essences forestières; 1981 August 31-September 4; Fontainbleau, France. Nangis, France: AFOCEL: 236-245.
- Bellarosa, R. 1982. **Cultivation of forest species *in vitro*.** Cellulosa e Carta. 10: 29-36.
- Berbee, F.M.; Berbee, J.G.; Hildebrandt, A.C. 1972. **Induction of callus and trees from stem tip cultures of a hybrid poplar.** In Vitro. 7(4): 269. Abstract.
- Boxus, Ph. 1985. **Micropropagation of woody plants.** Acta Botanica Neerlandica. 34: 236. Abstract.
- Bychenkova, E.A.; David, A. 1978. **Callus formation and organogenesis in tissues of leaves of *Populus balsamifera* L. cultivated *in vitro*.** Translated from Fiziologiya Rastenii. 25(2): 274-282. Plenum Publication Corporation. 216-222.
- Bychenkova, E.A.; Lazda, E.E. 1984. **Studies of the early stages of cell differentiation and xylogenesis in tissue culture of balsam poplar.** Khimiya Drevesiny. 3: 45-51.
- Chalupa, V. 1974. **Control of root and shoot formation and production of trees from poplar callus.** Biologia Plantarum (Prague). 16(4): 316-320.
- Chalupa, V. 1975. **Tissue cultures of forest tree species.** Abstract Bulletin of the Institute of Paper Chemistry. 47(2801): 83 p.
- Chalupa, Vladimir. 1981. **Clonal propagation of broad-leaved forest trees *in vitro*.** Communicationes Instituti Forestalis. 12: 255-271.
- Chalupa, Vladimir. 1983. **Micropropagation of conifer and broadleaved forest trees.** Communicationes Instituti Forestalis. 13: 7-39.
- Chardenon, J.; Taris, B. 1960. **Application of tissue culture techniques to the study of the physiology of *Populus*.** Joint culture of tissues of *Populus* and of fungi pathogenic to the genus. Bull. Serv. Cult. Etud. Peuplier et Saule, Paris (1;2): 10-24; 12-25.
- Chardenon, J.; Taris, B. 1960. **Studies on the resumption of growth by cambium of *Populus* cultivars grown *in vitro*.** Paris, France: C.R. Academy of Science. 251(1): 120-121.
- Chen, D.M.; Huang, M.R. 1980. **Culture of the apical tissue of *Populus nigra* cv. Blanc de Garonne and the variation of their isoenzymes.** Journal of Nanjing Technological College of Forest Products. 3: 104-107.
- Chen, W.; Guo, D.; Yang, S.; Ciu, C. 1983. **Rapid propagation of *Populus tomentosa* by tissue culture.** Chih Wu Hsueh Chi K'an (Botanical Research). 1(1): 135-138.
- Chen, W.; Guo, D.; Yang, S.; Tsui, C. 1980. **Organogenesis of leaf explant of *Populus davidiana* × *P. bolleana* Loucne hybrid and effect of growth regulators on organogenesis.** Acta Botanica Sinica. 22(4): 311-315.
- Chen, W.; Wang, H.; Yang, S.; Tsui, C. 1979. **Rapid propagation of *Populus davidiana* × *P. bolleana* Loucne hybrid by tissue culture.** K'o hsueh t'ung pao. Kexue tong-bao. 24(16): 758-760.
- Chun, Y.W. 1984. **Mass-propagation of *Populus alba* × *P. grandidentata* through *in vitro* culture.** Ames, IA: Iowa State University. 65 p. M.S. thesis.
- Chun, Y.W.; Hall, R.B. 1987. **Influence of subculturing period and different culture medium on cold storage of *Populus alba* × *Populus grandidentata* plantlets.** In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 462. Abstract.

- Chun, Y.W.; Klopfenstein, N.B.; Hall, R.B. 1987. **Morphogenetic potential of leaf, internode, and root explants from *Populus alba* x *Populus grandidentata* plantlets.** In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 462-463. Abstract.
- Coleman, G.D. 1989. **In vitro shoot regeneration in *Populus deltoides* Bartr. ex Marsh.** Lincoln, NE: University of Nebraska. 82 p. Ph.D. thesis.
- Coleman, Gary D.; Ernst, Stephen G. 1989. **In vitro shoot regeneration of *Populus deltoides*: effect of cytokinin and genotype.** Plant Cell Reports. 8: 459-462.
- Coleman, Gary D.; Ernst, Stephen G. 1989. **Role of cellular competence in the in vitro shoot regeneration response of *Populus deltoides*.** In: Programs and abstracts, 86th annual meeting of the American Society for Horticultural Science; 1989 July 29-August 3; Tulsa, OK. Alexandria, VA: American Society for Horticultural Science: 101. Abstract.
- Coleman, G.D., Ernst, S.G. 1990. **Axillary shoot proliferation and growth of *Populus deltoides* shoot cultures.** Plant Cell Reports. 9: 165-167.
- Coleman, G.D.; Ernst, S.G. 1990. **Shoot induction competence and callus determination in *Populus deltoides*.** Plant Science. 71(1): 83-92.
- Douglas, G.C. 1984. **Formation of adventitious buds in stem internodes of *Populus* spp. cultured in vitro on basal medium: influence of endogenous properties of explants.** Journal of Plant Physiology. 116: 313-321.
- Douglas, G.C. 1985. **Control and utilization of adventitious bud formation in *Populus* explants.** In: Advances in agricultural biotechnology. Dordrecht, The Netherlands: Martinus Nijhoff Publishers. 14: 53-58.
- Douglas, G.C. 1985. **Formation of adventitious buds in stem internodes of *Populus* hybrid TT32 cultured in vitro: effects of sucrose, zeatin, IAA and ABA.** Plant Physiology. 121: 225-231.
- Dujickova, M.; Chalupa, V.; Fikacova, J. 1976. **Rust a morfogenese kalusovych tkani *Populus euramericanana* (Dode) Guinier cv. 'Robusta'.** In: Novak, F.J., ed. Vyuziti kultur rostlinnych explantaty ve slechteni: sbornik mezinarodniho symposia; 1976 January 6-11; Olomouc, CSSR: 81-89.
- Ernst, Stephen G.; Coleman, Gary D. 1990. **Proteins associated with the transition from shoot regeneration competence to callus determined growth in internodal stem explants of *Populus deltoides*.** In: UCLA Symposia on molecular and cellular biology; 1990 March 31-April 22. Journal of Cellular Biochemistry. Suppl. 14E: 332. Abstract.
- Faltonson, R.; Thompson, D.; Gordon, J.C. 1983. **Propagation of poplar clones for controlled environment studies.** In: Methods of rapid early selection of poplar clones for maximum yield potential. Gen. Tech. Rep. NC-81. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 1-11.
- Frohlich, H.J. 1982. **Fortschritte bei der vegetativen Vermehrung.** Forstarchiv. 53(1): 3-9.
- Gautheret, R.J. 1959. **La culture des tissus vegetaux.** Masson and Cie Publishers. 863 p.
- Jacquierot, C. 1958. **Recherches sur la rhizogenes chez le tissu cambial de *Populus tremula* L. cultive in vitro.** C. R. Academy of Science. 247: 1489-1490.
- Joyce, Peter J.; Sellmer, James C.; McCown, Brent. 1986. **Causes of differential responses of shoot of *Populus* to mineral medium formulations.** HortScience. 21(3): 262. Abstract.

- Kapusta, J.; Skibinska, A. 1985. **Induction of morphogenesis and regeneration in the callus of *Populus alba* L. and *P. nigra* L.** Journal of Tree Sciences. 4(2): 34-38.
- Kim, J.H.; Moon, H.K.; Park, J.I. 1986. **Plantlet regeneration on callus derived from internodal tissue of *Populus alba* x *P. glandulosa*.** Research Report of the Institute of Forest Genetics, Korea. 22: 122-127.
- Kim, Myung Won; Hackett, Wesley. 1989. **Influences of polar auxin transport on polarity of adventitious bud formation in hybrid *Populus*.** In: Proceedings, annual meeting of the American Society of Plant Physiologists/Canadian Society of Plant Physiologists; 1989 July 30-August 3; Toronto, Ontario, Canada: 12. Abstract.
- Lee, Seung Woo; Hackett, Wesley P.; Ettinger, Terry L.; Read, Paul E. 1986. **Adventitious bud formation on hybrid *Populus* midrib and petiole segments cultured in vitro.** In: Somers, D.A.; Gengenbach, B.G.; Biesboer, D.D.; et al., eds. Proceedings, 6th International congress of plant tissue and cell culture; 1986 August 3-8; Minneapolis, MN. Minneapolis, MN: University of Minnesota: 398. Abstract.
- Lee-Stadelmann, O.Y.; Hackett, W.P.; Lee, S.W.; Read, P.E. 1987. **Induction of adventitious buds from microthinn cross section culture of midrib and petiole of hybrid *Populus* in vitro.** In Vitro. 23(3) Part 2: 46A. Abstract.
- Lee-Stadelmann, O.Y.; Hackett, W.P.; Lee, S.W.; Read, P.E. 1987. **Microthinn-cross section culture for studying bud morphogenesis in vitro.** In: Greuter, W.; Zimmer, B.; Behnke, H.-D., eds. Proceedings of the 14th International Botanical Congress; 1987 July 24-August 1; Berlin, West Germany. Berlin-Dahlem: Botanical Museum: 92. Abstract.
- Lee-Stadelmann, Ok Young; Lee, Sung Woo; Hackett, Wesley P.; Read, Paul E. 1989. **The formation of adventitious buds in vitro on micro-cross sections of hybrid *Populus* leaf midveins.** Plant Science. 61: 263-272.
- Li, Y.Q.; Yang, S.H.; Xu, Q.Y.; Li, W.Y. 1984. **Culture techniques for three clones of poplars of the Aigeiros group.** Forest Science and Technology (Linye Keji Tongxun). 9: 17-19.
- Lin, Jingfang. 1990. **Poplar and willow.** In: Chen, Z.; Evans, D.A.; Sharp, W.R.; Ammirato, P.V.; Sondahl, M.R., eds. Handbook of Plant Cell Culture. 6: 145-160.
- Lin, J.F.; Dong, M.S.; Huang, Q.C. 1980. **Tissue culture of three species of Sect. Leuce Duby (genus *Populus*).** Scientia Silvae Sinicae. 16: 58-64. Suppl.
- Lin, J.F.; Dong, M.S.; Huang, Q.C. 1983. **Tissue culture of *Populus adenopoda* and *P. grandidentata*.** Plant Physiology Communications (Zhiwu Shenglixue Tongxun). 2: 37.
- Liskova, Desana; Kakoniova, Daniela. 1985. **The regeneration - forest trees in vitro.** In: Prochazka, S.; Hradilik, J., eds. International symposium: Regulation of plant integrity; 1985 September 2-5; Brno, Czechoslovakia. Acta Universitatis Agriculturae. 33(3): 305-309.
- Mathes, Martin C. 1964. **The in vitro formation of plantlets from isolated aspen tissue.** Phytton. 21(2): 137-141.
- McCown, B.H. 1985. **From gene manipulation to forest establishment: shoot cultures of woody plants can be a central tool.** TAPPI Journal. 68: 116-119.
- Mehra, P.N.; Cheema, G.S. 1980. **Clonal multiplication in vitro of Himalayan poplar (*Populus ciliata*).** Phytomorphology. 30: 336-343.
- Mehra, P.N.; Cheema, G.S. 1985. **Differential response of male and female Himalayan poplar and *Populus alba* in vitro.** Phytomorphology. 35(1/2): 151-154.
- Moon, Heung Kyu; Shim, Woo Sub; Lee, Geun Soo. 1987. **Clonal variation in callus cultures of *P. alba* x *P. glandulosa*.** Research Report of the Institute of Forest Genetics, Korea. 23: 149-155.

- Nauioks, G.; Ewald, D.; Matschke, J. 1987. **In-Vitro-Kultivierung von *Populus* Spec.** Beitr. Forstwirtschaft, Berlin. 21(3): 102-106.
- Noh, E.R.; Lee, S.K.; Koo, Y.B.; Chung, K.H. 1988. **A mass propagation method of aspen using tissue culture and juvenile cutting techniques.** Research Report of the Institute of Forest Genetics, Korea. 24: 20-27.
- Noh, Eun-Woon; Minocha, Subhash C. 1986. **High efficiency shoot regeneration from callus of quaking aspen (*Populus tremuloides* Michx.).** Plant Cell Reports. 5: 464-467.
- Park, Y.G.; Son, S.H. 1988. **In vitro organogenesis and somatic embryogenesis from punctured leaf of *Populus nigra* x *P. maximowiczii*.** Plant Cell, Tissue and Organ Culture. 15(2): 95-105.
- Pelet, F. 1959. **Growth in vitro of grape, elm, poplar, willow, and oak tissues isolated from normal stems and insect galls.** Madison, WI: University of Wisconsin. 114 p. Ph.D. thesis.
- Pelet, F.; Hildebrandt, A. 1957. **Growth in vitro at various temperatures and acidities of tissues isolated from insect galls and normal stems of elm, grape, poplar, and willow.** Phytopathology. 47: 531. Abstract.
- Pelet, F.; Hildebrandt, A.C.; Riker, A.J.; Skoog, F. 1960. **Growth in vitro of tissues isolated from normal stems and insect galls.** American Journal of Botany. 47(3): 186-195.
- Prakash, C.S.; Thielges, B.A. 1987. **Plantlets from leaf discs of *Populus deltoides*.** In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 485. Abstract.
- Raj, A. Yesoda; Ho, Rong H.; Zsuffa, L. 1983. **In vitro propagation of forest trees by tissue culture.** In: Proceedings, 28th Northeastern forest tree improvement conference; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire: 281-290.
- Ren, Y. 1984. **Induction of test tube plants from *Populus alba* x *P. bolleyana*.** Plant Physiology Communications. 2: 33-34.
- Riemenschneider, D.; Haissig, B.; Michler, C. 1988. **Genetic effects on adventitious rooting in vitro in *Populus deltoides*.** In Vitro. 24(3) Part 2: 52A. Abstract.
- Riou, A.; Harada, H.; Taris, B. 1975. **Development of complete plants from tree cells of *Populus* callus.** C.R. Academy of Science, Series D. 280(23): 2657-2659.
- Rutledge, C.B.; Douglas, G.C. 1988. **Culture of meristem tips and micropropagation of 12 commercial clones of poplar in vitro.** Physiologia Plantarum. 72: 367-373.
- Saito, A. 1980. **Effects of inorganic elements in the medium on shoot differentiation from *Populus* callus.** Journal of Japanese Forestry Society. 62(4): 147-149.
- Saito, A. 1980. **Medium for shoot formation from somatic callus tissue in *Populus*.** Journal of Japanese Forestry Society. 62(7): 270-272.
- Saito, A.; Kawanobe, K. 1981. **Shoot formation in *Populus* callus tissues precultured in vitro on some different media.** Bulletin Forestry & Forest Products Research Institute, Japan. 316: 117-123.
- Sato, T. 1981. **Effects of the amount of NH_4NO_3 and the concentration of zeatin on shoot formation in aspen callus cultures.** Journal of Japanese Forestry Society. 63(2): 46-50.
- Schuette, Valerie J. 1989. **An anatomical study of in vitro adventitious shoot formation in *Populus deltoides* stem explants.** In: Programs and Abstracts, 86th annual meeting of the American Society for Horticultural Science; 1989 July 29-August 3; Tulsa, OK. Alexandria, VA: ASHS: 95. Abstract.

- Sellmer, J.C.; McCown, B.H.; Haissig, B.E. 1989. **Shoot culture dynamics of six *Populus* clones.** Tree Physiology. 5: 219-227.
- Son, Sung Ho; Hall, R.B. 1990. **Plant regeneration capacity of callus derived from leaf, stem, and root segments of *Populus alba* L. x *P. grandidentata* Michx.** Plant Cell Reports. 9: 344-347.
- Sumiya, K.; Sunakawa, T.; Ishimoto, T.; Kasai, Z. 1988. **Plant regeneration from long-term cultured callus of poplar (*Populus nigra*).** Journal of the Japan Wood Research Society. 34(4): 354-358.
- Thompson, D.G.; Gordon, J.C. 1977. **Propagation of poplars by shoot apex culture and nutrient film technique.** In: Proceedings, TAPPI forest biology wood chemistry conference; 1977 June 20-22; Madison, WI. Atlanta, GA: TAPPI Press: 77-82.
- Venverloo, C.J. 1973. **The formation of adventitious organs. I. Cytokinin-induced formation of leaves and shoots in callus cultures of *Populus nigra* L. 'Italica'.** Acta Botanica Neerlandica. 22(4): 390-398.
- Viss, P.; Ruzin, S.E. 1987. **High efficiency regeneration of shoots from *Populus* tissue cultures.** In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 492. Abstract.
- Winton, Lawson L. 1968. **Plantlets from aspen tissue cultures.** Science. 160(3833): 1234-1235.
- Winton, Lawson L. 1970. **Shoot and tree production from aspen tissue cultures.** American Journal of Botany. 57(8): 904-909.
- Winton, Lawson. 1971. **Tissue culture propagation of European aspen.** Forest Science. 17(3): 348-350.
- Wolter, K.E. 1964. **In vitro cultivation of ash, aspen, and pin oak callus tissue.** Madison, WI: University of Wisconsin. 179 p. Ph.D. thesis.
- Wolter, Karl E. 1968. **Root and shoot initiation in aspen callus cultures.** Nature. 219: 509-510.
- Wolter, K.E.; Gordon, J.C. 1972. **Hormonal control of growth and lignification in aspen cultures in relation to peroxidase level and isoenzyme expression.** Plant Physiology. 49(Suppl.): 32. Abstract.
- Xu, M.Z. 1987. **Propagation of aspen vialed tissue culture.** Journal of North-Eastern Forestry University, China. 15(3): 24-29.
- Zhou, L.; Gui, Y. 1983. **Organogenesis and plantlet formation of *Populus euphratica* cultured in vitro.** Chih Wu Hsueh Chi K'an (Botanical Research). 1(1): 125-126.
- ### CALLUS CULTURE
- Blackwell, Steven J.; Laetsch, W.M.; Hyde, Beal B. 1969. **Development of chloroplast fine structure in aspen tissue culture.** American Journal of Botany. 56(4): 457-463.
- Blanarikova, Vitazoslava; Karacsonyi, S. 1978. **The isolation of tissue culture of *Populus alba* L. 'pyramidalis'.** Biologia Plantarum (Prague). 20(1): 14-18.
- Blanarikova, Vitazoslava; Blanarik, Peter; Karacsonyi, Stefan. 1982. **Ultrastructure of tissue culture cells of white poplar (*Populus alba* L. "Pyramidalis").** Drevarsky Vyskum. 27(2): 1-10.
- Bloomberg, W.J. 1964. **Some factors in the development of callus in poplar cuttings.** Forestry Chronicle. 40: 509-511.
- Bychenkova, E.A. 1963. **Investigation of callus formation in some tree and shrub species by the method of tissue culture in vitro.** Doklady Akademii Nauk SSSR. 351(3): 732-736.

- Bychenkova, E.A. 1963. **The study of proliferation of cambium and parenchyma of branches from trees in cultures in vitro.** Biologia Plantarum (Prague). 5(4): 302-309.
- Gautheret, R.J. 1934. **Culture du tissu cambial.** C.R. Academy of Science (Paris). 198: 2195-2196.
- Hisajima, S.; Arai, Y.; Thorpe, T.A. 1985. **Sucrose synthesis in callus cultures.** Biologia Plantarum. 27(1): 74-77.
- Mathes, Martin C. 1964. **The culture of isolated triploid aspen tissue.** Forest Science. 10(1): 35-38.
- Mathes, Martin C.; Einspahr, Dean W. 1965. **Comparison of tree growth and callus production in aspen.** Forest Science. 11(3): 360-363.
- Nakamura, Yoshiji. 1973. **On the sterile culture of stem segment of trees (1) Effects of sugars on bud increment and callus formation on stem segment of *Populus euramericana* cv. I-455.** Journal of Japanese Forestry Society. 55(5): 161-165.
- Oota, Michiko; Fukuda, Tadanori; Terashima, Noritsugu; Kanda, Takashi. 1975. **Studies on tissue culture of tree-cambium. 1. Growth of callus tissue from poplar-cambium in vitro.** Japan Wood Research Society Journal. 21(2): 82-86.
- Sakai, A.; Sugawara, Yasutake. 1973. **Survival of poplar callus at super-low temperatures after cold acclimation.** Plant and Cell Physiology. 14: 1201-1204.
- Sakamoto, M.; Sumiya, K. 1985. **Some fundamental problems on measurements of the bioelectrical potential of poplar (*Populus nigra* L.) callus.** Mokuzai Gakkaishi. 31(8): 620-626.
- Winton, L.; Mathes, M.C. 1973. **Aspen callus.** In: Kruse, Paul F., Jr.; Patterson, M.K., Jr., eds. **Tissue Culture Methods and Applications.** New York, NY: Academic Press: 161-165.
- Winton, Lawson. 1968. **Initiation of friable aspen callus under different light environments.** Phyton. 25(1): 23-28.
- Winton, L.L. 1968. **The initiation of friable aspen callus.** Phyton. 25(1): 15-21.
- Winton, Lawson L. 1970. **Initiation of firm white aspen callus under different light environments.** Phyton. 27(1): 11-14.
- ANTHER CULTURE**
- Anonymous. 1975. **Induction of haploid poplar plants from anther culture in vitro.** Scientia Sinicae. 18(6): 769-777.
- Anonymous. 1977. **Induction of haploid poplar plantlets from pollen.** Acta Genetica Sinica. 4(1): 49-54.
- Chen, Z.H. 1986. **Induction of androgenesis in woody plants.** In: Haploids of higher plants in vitro. Beijing, China: China Academic Publishers: 42-66.
- Chen, Z.H.; Yao, Y.G.; Zhang, L.H. 1988. **Studies on embryogenesis of woody plants in China.** In: Ahuja, M.R., ed. Proceedings of the IUFR Working Party S2.04-07, somatic cell genetics of woody plants; 1987 August 10-13; Grosshansdorf, Federal Republic of Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 19-28.
- Ho, R.H. 1982. **Haploid plant culture in poplar.** In: Proceedings, 7th North American forest biology workshop; 1982 July 26-28; Lexington, KY. Lexington, KY: University of Kentucky: 210-213.
- Ho, Rong H.; Raj, A. Yesoda; Zsuffa, Louis. 1983. **Poplar plants through anther culture.** In: Proceedings, 28th Northeastern forest tree improvement conference; 1982 July 7-9; Durham, NH. Durham, NH: University of New Hampshire: 294-300.
- Ho, R.H.; Raj, Y. 1985. **Haploid plant production through anther culture in poplar.** Forest Ecology and Management. 13(3/4): 133-142.

- Hyun, S.K.; Kim, J.H.; Noh, E.W.; Park, J.I. 1986. **Induction of haploid plants of *Populus* species.** In: Withers, L.A.; Alderson, P.G., eds. Proceedings, 41st Nottingham Easter School: Plant tissue culture and its agricultural application. London: Butterworths Publishers: 413-418.
- Illies, Z.M. 1976. **Haploid plants of poplar induced from anther cultured in vitro.** In: 16th World Congress, Division 2, 267-271; Institute of Forestry, Academy of Forestry, Heilungkiang Province, 1976. *Acta Genetica Sinica*. 3(2): 145-149.
- Kim, J.H.; Moon, H.K.; Park, J.I. 1986. **Haploid plantlet induction through anther culture of *Populus maximowiczii*.** Research Report of the Institute of Forest Genetics, Korea. 22: 116-121.
- Kim, J.H.; Noh, E.W.; Park, J.I. 1983. **Haploid plantlets formation through anther culture of *Populus glandulosa*.** Research Report of the Institute of Forest Genetics. 19: 93-98.
- Liu, Yu-hsi; Chang, Hsiao-fang; Lu, Chi-hua. 1979. **Microsporogenesis of *Populus berolinensis* Dippel.** Journal of North-Eastern Forestry Institute. 2: 1-4.
- Lu, Chi-hua; Chang, Hsiao-fang; Liu, Yu-hsi; Chag, Pei-kao. 1979. **Observation of the chromosomes of somatic cells of poplar pollen plants.** Journal of North-Eastern Forestry Institute. 2: 14-22.
- Lu, Zhihua; Liu, Yuxi. 1990. **Poplar: anther culture.** In: Chen, Z.; Evans, D.A.; Sharp, W.R.; Ammiratoo, P.V.; Sondahl, M.R., eds. Handbook of plant cell culture. New York, NY: McGraw-Hill Publishing Company. 6: 161-182.
- Rajora, O.P.; Zsuffa, L. 1986. **Pollen viability of some *Populus* species as indicated by in vitro pollen germination and tetrazolium chloride staining.** Canadian Journal of Botany. 64: 1086-1088.
- Sato, T. 1974. **Callus induction and organ differentiation in anther culture of poplars.** Journal of Japanese Forestry Society. 56(2): 55-62.
- Stettler, R.F.; Bawa, K.S. 1971. **Experimental induction of haploid parthenogenesis in black cottonwood (*Populus trichocarpa* T. & G. ex Hook).** Silvae Genetica. 20: 15-25.
- Stoehr, M.U., Zsuffa, L. 1988. **Induction and evaluation of haploid and dihaploid lines in *Populus*.** Genome 30 (Suppl. 1): 438. Abstract.
- Stoehr, M.; Zsuffa, L. 1990. **Genetic evaluation of haploid clonal lines of a single donor plant of *Populus maximowiczii*.** Theoretical and Applied Genetics. 80: 470-474.
- Stoehr, M.U.; Zsuffa, L. 1990. **Induction of haploids in *Populus maximowiczii* via embryogenic callus.** Plant Cell, Tissue and Organ Culture. 23: 49-58.
- Stoehr, Michael U.; Zsuffa, Louis; Eckenwalder, James E. 1988. **Anomalous solitary flowers on anther-derived plants of *Populus maximowiczii*.** American Journal of Botany. 75(4): 594-597.
- Toru, S. 1974. **Callus induction and organ differentiation in anther culture of poplars.** Jap. Forest. Soc. 56: 55-62.
- Uddin, M.R.; Jokela, J.J.; Meyer, M.M., Jr. 1985. **Production of haploid and dihaploid plants for use in genetic studies and breeding of poplars.** In: Guries, R.P., ed. Proceedings of the 4th North Central tree improvement conference; 1985 August 12-14; East Lansing, MI. Madison, WI: University of Wisconsin, Department of Forestry: 157-166.
- Uddin, M.R.; Meyer, M.M., Jr.; Jokela, J.J. 1988. **Plantlet production from anthers of Eastern cottonwood (*Populus deltoides*).** Canadian Journal of Forest Research. 18: 937-941.

- Wang, C.C.; Chu, Z.C.; Sun, C.S. 1975. **The induction of *Populus* pollen plants.** Acta Botanica Sinica. 17: 56-59.
- Wolter, K.E.; McCown, B.H. 1989. **An attempt at generating haploid lines of poplar species for genetic manipulation and breeding programs.** Annales des Sciences Forestiers. 46: 598-600.
- Wu, Kexian. 1990. **Poplar: ovary culture.** In: Chen, Z.; Evans, D.A.; Sharp, W.R.; Ammirato, P.V.; Sondahl, M.R., eds. Handbook of plant cell culture. New York: McGraw-Hill Publishing Company. 6: 183-190.
- Wu, K.; Xu, M. 1984. **In vitro induction of maternal haploid plants from unpollinated ovaries of poplar.** Acta Genetica Sinica. 11: 47-51.
- Wu, K.; Xu, M.; Xie, Q. 1980. **Studies on chromosome spontaneous doubling and artificial doubling in poplar pollen plants.** Forest Science and Technology. 3: 6-10.
- Yang, Y.P.; Wang, S.L.; Zeng, S.Y.; Jin, Y.H. 1980. **The ways of poplar pollen development and the effect of some factors in vitro.** Scientia Silvae Sinicae. 16(4): 257-263.
- Zhang, J.; Liu, Y.; Lu, Z. 1979. **Cytological observation on microsporogenesis in poplar pollen culture.** Journal of the Northwest Forestry College. 2: 5-13.
- Zhu, Xiang-yu; Wang, Rui-ling; Liang, Yan. 1980. **Induction of poplar pollen plantlets.** Scientia Silvae Sinicae. 16: 190-197.
- ### ORGAN CULTURE
- Ahuja, M.R. 1984. **Short note: a commercially feasible micropropagation method for aspen.** Silvae Genetica. 33(4-5): 174-176.
- Ahuja, M.R.; Krusche, D.; Melchior, G.H. 1988. **Determination of plantlet regeneration capacity of selected aspen clones in vitro.** In: Ahuja, M.R., ed. Proceedings of the IUFRO Working Party S2.04-07, somatic cell genetics of woody plants; 1987 August 10-13; Grosshansdorf, Federal Republic of Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 127-135.
- Ba, Yanlei; Guo, Jianshong. 1990. **Poplar: rapid propagation.** In: Chen, Z.; Evans, D.A.; Sharp, W.R.; Ammirato, P.V.; Sondahl, M.R., eds. Handbook of Plant Cell Culture. 6: 191-198.
- Barocka, K.H.; Baus, M.; Lontke, E.; Sievert, F. 1985. **Tissue culture as a tool for in vitro-mass-propagation of aspen.** Z. Pflanzenzuchtg. 94: 340-343.
- Bawa, K.S.; Stettler, R.F. 1972. **Organ culture with black cottonwood: morphogenetic response of female catkin primordia.** Canadian Journal of Botany. 50: 1627-1631.
- Brand, R.; Venverloo, C.J. 1973. **The formation of adventitious organs. 2. The origin of buds formed on young adventitious roots of *Populus nigra* L. 'Italica'.** Acta Botanica Neerlandica. 22(4): 399-406.
- Chalupa, Vladimir. 1979. **In vitro propagation of some broad-leaved forest trees.** Communications Instituti Forestalis. 11: 159-170.
- Christie, C.B. 1978. **Rapid propagation of aspens and silver poplars using tissue culture techniques.** Proceedings of International Plant Propagation Society. 28: 255-260.
- Chun, Young Woo; Hall, Richard B.; Stephens, Loren C. 1986. **Influences of medium consistency and shoot density on in vitro shoot proliferation of *Populus alba* x *P. grandidentata*.** Plant Cell, Tissue and Organ Culture. 5: 179-185.
- Evers, P.W. 1982. **Propagation of forest trees by tissue culture: in vitro plant development for forestry requirements.** Jaargang 54(9): 267-277.

- Evers, P.W. 1985. **Vegetative propagation of forest trees in vitro.** Acta Botanica Neerlandica. 34: 236-238. Abstract.
- Evers, P.; Prat, A. 1984. **Propagation research with poplars in plant raising tubes.** Populier (Netherlands). 21(1): 17-20.
- Evers, P.W.; Donkers, J.; Prat, A.; Vermeer, E. 1988. **Micropropagation of forest trees through tissue culture.** Wageningen, The Netherlands: Pudoc. 85 p.
- Frohlich, H.J.; Weisgerber, H. 1985. **Research on in vitro-techniques within the framework of poplar breeding-results and future trends.** Silvae Genetica. 34(4/5): 132-137.
- Hall, R.B.; Colletti, J.P.; Schultz, R.C.; Faltonson, R.R.; Kolison, S.H., Jr.; Hanna, R.D.; Hillson, T.D.; Morrison, J.W. 1990. **Commercial-scale vegetative propagation of aspens.** In: Adams, Roy D., ed. Proceedings, Aspen Symposium '89; 1989 July 25-27; Duluth, MN. Gen. Tech. Rep. NC-140. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 211-219.
- Kim, Jae Hun; Lee, Suk Koo; Chun, Young Woo. 1981. **Mass propagation of tree species through in vitro culture. 1. Bud culture of *Populus alba* x *P. glandulosa*.** Research Report of the Institute of Forest Genetics, Korea. 17: 57-63.
- Kim, Jae Hun; Shim, Sang Yung; Noh, Eun Woon; Park, Jae In. 1982. **Mass production of selected poplar clones through bud culture.** Research Report of the Institute of Forest Genetics, Korea. 18: 80-85.
- Kolevska-Pletikapic, Branka. 1985. **Clonal propagation of leuce poplars by tissue culture technique.** Topola. 29: 3-8.
- Kouider, Mohamed; Skirvin, Robert M.; Saladin, K. Paul; Dawson, Jeffrey O.; Jokela, Jalmer J. 1984. **A method to culture immature embryos of *Populus deltoides* in vitro.** Canadian Journal of Forest Research. 14: 956-958.
- Li, C.C.; Chang, L.; Kuo, F.; Chang, K.C. 1979. **Bud culture in vitro of a new variety of poplar, *Populus davidiana* Dode x *Populus bolleana* Louche.** Yichuan IHeriditas. 1(4): 27-28.
- Li, Wendian; Li, Jiangshan. 1985. **In vitro culture of hybrid ovules in *Populus*.** Scientia Silvae Sinicae. 21(4): 339-346.
- Li, Wendian; Wang, Ruiling; Zhu, Xiangyu. 1983. **On the embryonic development and ovule culture of interspecific hybrids between *Populus simonii* Carr and *P. pyramidalis* Borkh.** Acta Botanica Sinica. 25(5): 409-417.
- Lubrano, Letizia. 1981. **Micropropagation du peuplier.** In: Touzet, G., ed. Proceedings, Colloque international sur la culture *in vitro* du essence forestieres; 1981 August 31-September 4. Fontainbleau, France. Nangis, France: AFOCEL: 81-86.
- Lubrano, Letizia. 1981. **Micropropagazione del pioppo.** Cellulosa e Carta (Rome). 12: 3-11.
- Lubrano, L. 1986. **Micropropagation of forest trees at the agricultural and forest research centre of Rome: preliminary results on *Eucalyptus* x *trabutii*.** In: Withers, L.A.; Alderson, P.G., eds. Proceedings, 41st Nottingham Easter School: Plant tissue culture and its agricultural application. London: Butterworths Publishers. 21. Abstract.
- Mandal, Abul. 1989. **Micropropagation of *Populus tremula* L.: condition for induction of shoots and roots.** Scandinavian Journal of Forest Research. 4: 285-293.
- Noh, E.R.; Koo, Y.B.; Lee, S.K. 1986. **Hybridization between incompatible poplar species through ovary and embryo culture.** Research Report of the Institute of Forest Genetics, Korea. 22: 9-14.
- Savka, M.A. 1985. **The *in vitro* culture of ovules containing an immature embryo of *Populus deltoides* Bartr. and *P. heterophylla*.** Urbana, IL: University of Illinois-Urbana. 78 p. M.S. thesis.

- Savka, Michael A.; Dawson, Jeffrey O.; Jokela, Jalmer J.; Skirvin, Robert M. 1987. A liquid culture method for rescuing immature embryos of eastern cottonwood. *Plant Cell, Tissue and Organ Culture*. 10: 221-226.
- Savka, Michael A.; Jokela, Jalmer J.; Skirvin, Robert M.; Dawson, Jeffrey O. 1985. Action of 6-benzylamino purine and indole-3-butyric acid on development of immature embryos of *Populus deltoides* Bartr. In: Guries, R.P., ed. *Proceedings, 4th North Central Tree Improvement Association meeting; 1985 August 12-14; East Lansing, MI*. Madison, WI: Department of Forestry: 140-148.
- Savka, M.A.; Skirvin, R.M.; Jokela, J.J.; Dawson, J.O. 1985. Culture of ovules containing immature embryos of eastern cottonwood *in vitro*. In: Dawson, Jeffrey O.; Majerus, Kimberly A., eds. *Proceedings, 5th Central hardwood forest conference; 1985 April 15-17; Urbana-Champaign, IL*. SAF Publ. 85-05. Urbana-Champaign, IL: Department of Forestry: 234-238.
- Son, Sung Ho; Hall, Richard B. 1990. Multiple shoot regeneration from root organ cultures of *Populus alba* x *P. grandidentata*. *Plant Cell, Tissue and Organ Culture*. 20: 53-57.
- Wann, S.R.; Einspahr, D.W. 1986. Reliable plantlet formation from seedling explants of *Populus tremuloides* (Michx.). *Silvae Genetica*. 35(1): 19-24.
- Wann, S.R.; Wyckoff, G.W.; Wyckoff, J.L. 1988. A tissue culture solution to a forestry problem - the propagation of a tetraploid European aspen. *Tree Planters' Notes*. Summer: 28-30.
- Welander, M.; Jansson, E.; Lindqvist, H. 1989. In vitro propagation of *Populus x wilsonii* - a hybrid of ornamental value. *Plant Cell, Tissue and Organ Culture*. 18: 209-219.
- Whitehead, H.C.M.; Giles, K.L. 1977. Rapid propagation of poplars by tissue culture methods. *New Zealand Journal of Forestry Sciences*. 7(1): 40-43.
- Zeldin, Eric L.; McCown, Brent. 1986. The dynamics of poplar root culture and the differentiation of shoots from cultured roots. *HortScience*. 21(3): 815. Abstract.
- ### PROTOPLAST CULTURE
- Ahuja, M.R. 1982. Isolation, culture and fusion of protoplasts: problems and prospects. *Silvae Genetica*. 31(2-3): 66-77.
- Ahuja, M.R. 1983. Short note: isolation and culture of mega and normal protoplasts in aspen. *Silvae Genetica*. 32(5-6): 225-227.
- Ahuja, M.R. 1984. Protoplast research in woody plants. *Silvae Genetica*. 33(1): 32-37.
- Ahuja, M.R. 1987. Prospects and limitations of protoplast research and gene transfer in forest tree species. *Swiss Biotechnology*. 5(6): 19-20.
- Ahuja, M.R.; Muhs, H.J. 1982. Control of growth and differentiation in tissues and protoplast derived callus in different genotypes of aspen. In: Fujiwara, Akio, ed. *Plant tissue culture 1982: Proceedings, 5th International congress plant tissue and cell culture; 1982 July 11-16; Tokyo and Lake Yamanaka, Japan*. Tokyo, Japan: Japanese Association for Plant Tissue Culture: 177-178.
- Butt, Adrian D. 1985. A general method for the high-yield isolation of mesophyll protoplasts from deciduous tree species. *Plant Science*. 42: 55-59.
- Cheema, G.S. 1988. Isolation and culture of protoplasts from totipotent cell cultures of *Populus ciliata*. *Progr. Plant Protoplast Res.* (107-08).

- Chun, Young Woo. 1985. **Isolation and culture of in vitro cultured *Populus alba* x *P. grandidentata* protoplasts.** Journal of Korean Forestry Society. 71: 45-49.
- Doi, K.; Ho, K.; Shibata, M. 1985. **Basic studies on protoplast culture in woody plants. 1. Culture on the B5 basal medium.** Tech. Note 239. Japan: Oji Institute for Forest Tree Improvement: 59-60.
- Douglas, Gerard. 1982. **Protoplast isolation from totipotent cell-cultures of *Populus* hybrid TT32.** In: Fujiwara, Akio, ed. Plant tissue culture 1982: Proceedings, 5th International congress plant tissue and cell culture; 1982 July 11-16; Tokyo and Lake Yamanaka, Japan. Tokyo, Japan: Japanese Association for Plant Tissue Culture: 605-606.
- Hillson, T.D.; Schultz, R.C. 1987. **Using leaves from tissue culture propagated plants for protoplast isolation.** In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 470. Abstract.
- Jang, S.S.; Lee, J.J.; Lee, J.S.; Lee, S.K. 1987. **Isolation, culture and fusion of protoplasts of *Populus glandulosa* Uyeki.** Research Report of the Institute of Forest Genetics, Korea. 23: 137-142.
- Kakoniova, D.; Liskova, D. 1984. **The protoplast isolation from woody tissue cultures.** International Symposium on Plant Tissue and Cell Culture Application to Crop Improvement. 80. Abstract.
- Kakoniova, D.; Liskova, D. 1985. **The protoplast isolation, culture and fusion from tissue cultures of forest trees.** Acta Universitatis Agriculturae Brno. A Facultas Agronomica. 33(3): 315-317.
- Lee, J.S.; Lee, S.K.; Jang, S.S.; Lee, J.J. 1987. **Plantlet regeneration from callus protoplasts of *Populus nigra*.** Research Report of the Institute of Forest Genetics, Korea. 23: 143-148.
- McCown, B.H. 1988. **Recent advances in protoplast culture of horticultural crops: ornamental trees and shrubs.** Scientia Horticulturae. 37: 257-265.
- Park, Y.G.; Han, K.H. 1986. **Isolation and culture of mesophyll protoplasts from in vitro cultured *Populus alba* x *P. glandulosa*.** Journal of Korean Forestry Society. 73: 33-42.
- Park, Y.G.; Son, S.H. 1986. **Factors affecting the isolation of mesophyll protoplasts from *Populus euramericana* (cv. I-214).** Journal of Korean Forestry Society. 74: 29-36.
- Park, Y.G.; Son, S.H. 1987. **Protoplast isolation from callus and suspension culture cells of *Populus alba*.** Korean Journal of Genetics. 9(3): 133-140.
- Park, Y.G.; Son, S.H. 1988. **Culture and regeneration of *Populus alba* x *glandulosa* leaf protoplasts isolated from in vitro cultured explant.** Journal of Korean Forestry Society. 77: 208-215.
- Park, Y.G.; Son, S.H.; Han, K.H. 1987. **Isolation and culture of mesophyll protoplasts from *Populus* species.** In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 483. Abstract.
- Russell, J.A. 1989. **Culture and manipulation of *Populus* protoplasts as a foundation for genetic engineering research.** Madison, WI: University of Wisconsin-Madison. 239 p. Ph.D. thesis.
- Russell, Julie A.; McCown, Brent H. 1986. **Culture and regeneration of *Populus* leaf protoplasts isolated from non-seedling tissue.** Plant Science. 46: 133-142.
- Russell, Julie A.; McCown, B.H. 1986. **Isolation, culture, and regeneration of *Populus* mesophyll protoplasts.** HortScience. 21(3): 699. Abstract.

- Russell, Julie A.; McCown, Brent H. 1986. **Techniques for enhanced release of leaf protoplasts in *Populus*.** Plant Cell Reports. 5: 284-287.
- Russell, J.A.; McCown, B.H. 1986. **Thidiazuron - stimulated shoot differentiation from protoplast - derived cells of *Populus*.** In: Somers, D.A.; Gengenbach, B.G.; Biesboer, D.D.; et al., eds. Abstracts, 6th International congress of plant tissue and cell culture; 1986 August 3-8; Minneapolis, MN. Minneapolis, MN: University of Minnesota: 49. Abstract.
- Russell, J.A.; McCown, B.H. 1988. **A protoplast system for *Populus* which will support genetic engineering research of tree species.** Progr. Plant Protoplast Res. (109-10).
- Russell, Julie A.; McCown, B.H. 1988. **Highly purified subpopulations of protoplasts show superior competency for use in genetic manipulations.** HortScience. 23(3): 780. Abstract.
- Russell, Julie A.; McCown, Brent H. 1988. **Recovery of plants from leaf protoplasts of hybrid-poplar and aspen clones.** Plant Cell Reports. 7: 59-62.
- Russell, Julie A.; Zeldin, Eric L.; McCown, Brent H. 1985. **Leaf grinding improves release of mesophyll protoplasts.** HortScience. 20(3): 571. Abstract.
- Saito, Akira. 1976. **Isolation of protoplasts from mesophyll cells of *Paulownia fortunei* Hemsl. and *Populus euramericana* cv. I-45/51.** Journal of Japanese Forestry Society. 58(8): 301-305.
- Saito, A. 1980. **Fusion of protoplasts isolated from somatic cells of tree species.** Bulletin Forestry & Forest Products Research Institute. 309: 7-12.
- Saito, Akira. 1980. **Isolation of protoplasts from mesophyll cells of *Paulownia* and *Populus*.** Bulletin Forestry & Forest Products Research Institute. 309: 1-6.
- Saito, A.; Hosoi, Y.; Ishii, K.; Sato, T. 1987. **Callus formation from protoplasts of mesophyll cells of *Populus* plantlets.** Journal of Japanese Forestry Society. 69(12): 472-477.
- Saito, Akira; Hosoi, Yoshihisa; Ishii, Katsuaki; Sato, Toru. 1988. **Protoplast isolation, somatic hybridization and eye-visible colony formation in different *Populus* species.** Journal of the Japanese Forestry Society. 70(3): 119-126.
- Shibata, M.; Ho, K.; Dot, K.; Tatemichi, Y. 1984. **Basic studies on the protoplast isolation from woody plants. 3. Optimum conditions for the isolation of protoplasts from cultured cells.** Tech. Note 227. Japan: Oji Institute for Forest Tree Improvement. 2 p. [Reprinted from: Translations of the 33d meeting, Chubu Br. Japanese Forestry Society. (1985) 145-146.]
- Smith, M.A.L.; Palta, J.P.; McCown, B.H.; Steffen, K.L. 1989. **Plasmolytic behavior of the donor cell may affect protoplast response.** Physiologia Plantarum. 76: 201-204.
- Verma, Devi C.; Wann, S.R. 1983. **Isolation of high yields of viable protoplasts from quaking aspen seedlings and cultured loblolly pine cell suspensions.** In: Potrykus, I.; Harms, C.T.; Hinnen, A.; et al., eds. Proceedings, 6th International protoplast symposium; 1983 August 12-16; Basel, Switzerland. Basel, Switzerland: Birkhauser, Verlag: 10-11.
- Youn, Yang; Lee, Jae Soon; Lee, Suk Koo. 1985. **Isolation and culture of protoplasts from suspension-cultured cells of *Populus alba* x *P. glandulosa*.** Research Report of the Institute of Forest Genetics, Korea. 21: 109-113.

SUSPENSION CULTURE

- Bilisics, L.; Karacsonyi, S.; Kubackova, M. 1979. **A simple procedure of the preparation of suspensions suitable for an estimate of cell number in established tissue culture of white poplar (*Populus alba* L. 'pyramidalis')**. Biologica Plantarum, Prague. 21(5): 390-394.
- Binder, W.D.; Zaerr, J.B. 1981. **Effets de deux agents chelatants sur la croissance de suspensions cellulaires de peuplier et de douglas**. In: Touzet, G., ed. Proceedings, Colloque international sur la culture "in vitro" des essences forestières; 1981 August 31-September 4; Fontainbleau, France. Nangis, France: AFOCEL: 254-260.
- Binder, W.D.; Zaerr, J.B. 1981. **Effet du DMSO et du glycerol sur la croissance de suspensions cellulaires de douglas et de peuplier**. In: Touzet, G., ed. Proceedings, Colloque international sur la culture "in vitro" des essences forestières; 1981 August 31-September 4; Fontainbleau, France. Nangis, France: AFOCEL: 261-268.
- Cheema, G.S. 1987. **Somatic embryogenesis and plant regeneration from tissue and cell suspension cultures of selected mature Himalayan poplar**. In: Hanover, James, W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 461. Abstract.
- Cheema, G.S. 1989. **Somatic embryogenesis and plant regeneration from cell suspension and tissue cultures of mature Himalayan poplar (*Populus ciliata*)**. Plant Cell Reports. 8(2): 124-127.
- Jang, S.S.; Lee, J.J.; Lee, J.S.; Lee, S.K.; Shim, S.Y. 1988. **Plant regeneration from cell culture of *Populus glandulosa* Uveki**. Research Report of the Institute of Forest Genetics, Korea. 24: 107-113.
- Lee, Kyung Joon; Lee, Jae Soon; Lee, Suk Koo. 1984. **Callus formation from suspension-cultured cells of *Pinus rigida* x *P. taeda* and cell suspension culture of *Populus alba* x *P. glandulosa***. Research Report of the Institute of Forest Genetics, Korea. 20: 108-115.
- Matsumoto, Takashi; Nishida, Koh; Noguchi, Masao; Tamaki, Einosuke. 1970. **Isolation and identification of an anthocyanin from the cell suspension culture of poplar**. Agricultural and Biological Chemistry. 34(7): 1110-1114.
- Matsumoto, Takashi; Nishida, Koh; Noguchi, Masao; Tamaki, Einosuke. 1973. **Some factors affecting the anthocyanin formation by *Populus* cells in suspension culture**. Agricultural and Biological Chemistry. 37(3): 561-567.
- Matsumoto, Takashi; Okunishi, Keiko; Nishida, Koh; Noguchi, Masao. 1972. **Effects of physical factors and antibiotics on the growth of higher plant cells in suspension culture**. Agricultural and Biological Chemistry. 36(12): 2177-2183.
- Matsumoto, Takashi; Okunishi, Keiko; Nishida, Koh; Noguchi, Masao; Tamaki, Einosuke. 1971. **Studies on the culture conditions of higher plant cells in suspension culture. Part 2. Effect of nutritional factors on the growth**. Agricultural and Biological Chemistry. 35(4): 543-551.
- McCown, B.H.; Zeldin, E.L.; Pinkalla, H.A.; Dedolph, R.R. 1986. **Nodule culture: a developmental pathway with high potential for regeneration, automated micropropagation, and plant metabolite production from woody plants**. In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 149-166.

- Michler, C.; Bauer, E. 1987. Somatic embryogenesis in plant cell cultures of *Populus*. In Vitro. 23(3) Part 2: 46A. Abstract.
- Park, Y.G.; Son, S.H. 1988. Regeneration of plantlets from cell suspension culture derived callus of white poplar (*Populus alba L.*). Plant Cell Reports. 7: 567-570.
- Riou, Andre; Harada, Hiroshi; Taris, Bernard. 1975. Histophysiology vegetale. - Production de plantes entieres a partir de cellules separees de cals de *Populus*. C.R. Academy Science, Paris. 280(23): 2657-2659.
- Winton, Lawson L. 1968. The rooting of liquid-grown aspen callus. American Journal of Botany. 55(2): 159-167.
- Zhang, L.G.; Zhang, Y.H.; Wang, F.C.; Liu, S.L. 1981. Induction of somatic embryogenesis in *Populus*. Scientia Silvae Sinicae. 17(4): 426-427.
- ### RESISTANCE SCREENING
- Amerson, H.V.; Mott, R.L. 1990. In vitro selection for disease resistance in trees with emphasis on conifers. In Vitro. 26(3), part 2: 25A. Abstract.
- Belanger, R.; Manion, P.; Griffin, D. 1988. A tissue culture system for assessing effects of moisture stress on *Hypoxyylon mammatum* ascospore infection of aspen clones. Phytopathology. 77(12): 1727. Abstract.
- Belanger, R.R.; Manion, P.D.; Griffin, D.H. 1989. *Hypoxyylon mammatum* ascospore infection of *Populus tremuloides* clones: effects of moisture stress in tissue culture. Phytopathology. 79(3): 315-317.
- Belanger, R.R.; Manion, P.D.; Griffin, D.H. 1990. Amino acid content of water-stressed plantlets of *Populus tremuloides* clones in relation to clonal susceptibility to *Hypoxyylon mammatum* in vitro. Canadian Journal of Botany. 68(1): 26-29.
- Belanger, R.R.; Falk, S.P.; Manion, P.D.; Griffin, D.H. 1989. Tissue culture and leaf spot bioassays as variables in regression models explaining *Hypoxyylon mammatum* incidence on *Populus tremuloides* clones in the field. Phytopathology. 79(3): 318-321.
- Choi, Wan Yong; Lee, Suk Koo; Lee, Byung Sil. 1987. Effects of aluminum on growth of *Populus koreana* x *P. nigra* var. *italica* through cell and callus culture in vitro. Research Report of the Institute of Forest Genetics, Korea. 23: 132-136.
- Cox, R.M. 1987. The effects of wet deposited acidity and copper on the reproductive biology of *Populus tremuloides*. In: Proceedings, Forest decline and reproduction: regional and global consequences; Working Paper WP-87-57; International Institute for Applied Systems Analysis; 1987 March 23-27; Krakow, Poland. 141-150.
- Diaz-Colon, J.D.; Bovey, R.W.; Davis, F.S.; Baur, J.R. 1972. Comparative effects and concentration of picloram, 2,4,5-T and dicamba in tissue culture. Physiologia Plantarum. 27: 60-64.
- Kechel, H.G.; Boden, E. 1985. Early testing during in-vitro-phase-an operational method of securing production. Forstarchiv. 56(1): 34-35.
- Kechel, H.G.; Boden, E. 1985. Resistance tests on poplars raised by tissue culture. European Journal of Forest Pathology. 15(1): 45-51.
- Kechel, H.G.; Boden, E. 1988. Early diagnosis of resistance properties by means of meristem culture. Allgemeine Forstzeit-Schrift. 43(49): 1353-1354.
- Krawiarz, K.; Przybyl, K. 1981. Changes in the poplar callus tissue of the in vitro culture caused by the bacteria *Xanthomonas populi* (Ride) and *Pseudomonas syringae* Van Hall. In: International Poplar Commission; IUFRO, Joint symposium on resistance mechanisms in poplar diseases;

- 1980 September 1-5; Kornik, Poland. Angers, France: INRA: 163-167.
- Kruger, B.M.; Manion, P.D. 1990. Inheritance of response of *Populus tremuloides* tissue culture plantlets to bioassays of toxic metabolites of *Hypoxyylon mammatum*. *Phytopathology*. 80(1): 120. Abstract.
- Kruger, B.M.; Manion, P.D. 1990. Relationship between *in vitro* ascospore and toxic metabolite bioassays of *Populus tremuloides* tissue culture plantlets. *Phytopathology*. 80(10): 977. Abstract.
- Ksiazek, Małgorzata; Wozny, Adam; Młodzianowski, Fortunat. 1984. Effect of $Pb(NO_3)_2$ on poplar tissue culture and the ultrastructural localization of lead in culture cells. *Forest Ecology and Management*. 8(2): 95-105.
- Lange, A. de. 1968. Pathogenesis of *Aplanobacter populi* in cuttings and explants of *Populus candicans*. *Mededeling*. 70: 10-71.
- Lee, B.S.; Youn, Y.; Kim, Y.J. 1986. Variation in salt tolerance of hybrid poplars through *in vitro* culture. Research Report of the Institute of Forest Genetics, Korea. 22: 139-144.
- Li, J.; Chen, W.Y. 1984. Studies on screening of salt-tolerant cell lines of poplar and the regrowth of adventitious shoots. Liaoning, China: Poplar Research Institute; Forest Science and Technology. 1: 1-3.
- Ostry, M.; Bucciarelli, B.; Sain, S.; Hackett, W.P.; Anderson, N.A. 1990. Developing tissue culture systems for increasing the disease resistance of aspen. In: Adams, Roy D., ed. Proceedings, Aspen Symposium '89; 1989 July 25-27; Duluth, MN. Gen. Tech. Rep. NC-140. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 315-318.
- Riou, A.; Harada, H.; Taris, B. 1975. Successful *in vitro* culture of *Melampsora alli-populina* Kleb. using a synthetic medium containing free cells of callus of *Populus x euramericana* (Dode) Guinier cv. 'Robusta'. C.R. Academy Science, Serie D. 280(24): 2765-2767.
- Singh, S.J.; Heather, W.A. 1982. Assessment *in vitro* of resistance in cultivars of *Populus* to *Melampsora medusae* Thum. leaf rust. *Australian Forestry Research*. 12(1): 37-45.
- Valentine, F.; Baker, S.; Belanger, R.; Manion, P.; Griffin, D. 1988. Screening for resistance to *Hypoxyylon mammatum* in *Populus tremuloides* callus and micropropagated plantlets. In: Ahuja, M.R., ed. Proceedings of the IUFRO Working Party S2.04-07: somatic cell genetics of woody plants; 1987 August 10-13; Grosshansdorf, Federal Republic of Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 181. Abstract.
- Wann, Steven Russell. 1986. *In vitro* isolation and propagation of mammatoxin-resistant aspen. Dissertation Abstracts International. 47/03-B: 873.
- #### TRANSFORMATION AND SOMACLONAL VARIATION
- Anonymous. 1988. Foreign gene helps poplar resist pests. *Bioprocessing Technology*. 10(9): 3, 6.
- Anonymous. 1987. Herbicide resistance genetically engineered into poplars. *Bioprocessing Technology*. 9(4): 6.
- Anonymous. 1990. Somaclonal variation for disease resistance in *Populus deltoides* (Eastern cottonwood). International Plant Biotechnology Network, Tissue Culture for Crops Project, Newsletter 11: 6.
- Bednarek, S.Y.; Russell, J.A.; Sellmer, J.C.; McCown, B.H. 1987. Stable transformation of a woody plant by electric field-mediated gene transfer. *In Vitro*. 23(3): 66. Abstract.

- Cheliak, W.M.; Klimaszewska, K. 1990. Cell, protoplast and tissue culture of short-rotation species. *Biomass*. 22: 63-73.
- Cheliak, W.M.; Rogers, D.L. 1990. Integrating biotechnology into tree improvement programs. *Canadian Journal of Forest Research*. 20(4): 452-463.
- Chun, Y.W. 1987. Biotechnological applications of *Populus* micropropagation. Ames, IA: Iowa State University. 155 p. Ph.D. dissertation.
- Chun, Young Woo; Klopfenstein, Ned B.; McNabb, Harold S., Jr.; Hall, Richard B. 1988. Biotechnological applications in *Populus* species. *Journal of Korean Forestry Society*. 77(4): 467-483.
- Chun, Young Woo; Klopfenstein, Ned B.; McNabb, Harold S., Jr.; Hall, Richard B. 1988. Transformation of *Populus* species by an *Agrobacterium* binary vector system. *Journal of the Korean Forestry Society*. 77(2): 199-207.
- Coleman, Gary D.; Ernst, Stephen G. 1989. Targeting cells of *Populus deltoides* explants for transformation by *Agrobacterium tumefaciens*. *Journal of Cellular Biochemistry*. Suppl. 13D: 255. Abstract.
- De Block, Marc. 1990. Factors influencing the tissue culture and the *Agrobacterium tumefaciens*-mediated transformation of hybrid aspen and poplar clones. *Plant Physiology*. 93(3): 1110-1116.
- Einspahr, D.W.; Wann, S.R. 1985. Use of tissue culture techniques in a hardwood tree improvement program. In: Schmidtling, R.C.; Grigg, M., ed. *Proceedings, 18th Southern forest tree improvement conference*; 1985 May 21-23; Long Beach, MS. Gulf Park, MS: University of Southern Mississippi: 33-41.
- Ettinger, Terry L.; Read, Paul E.; Hackett, Wesley P.; Ostry, Michael E.; Skilling, Darroll D. 1986. Development of resistance in *Populus* to *Septoria musiva* utilizing somaclonal variation. In: Caron, F.; Corriveau, A.G.; Boyle, T.J.B., eds. *Proceedings of the 20th meeting of the Canadian Tree Improvement Association: part 2: Symposium on new ways in forest genetics*; 1985 August 19-22; Quebec City, Quebec, Quebec, Canada: Canadian Tree Improvement Association: 83-90.
- Ettinger, T.L.; Ostry, M.E.; Hackett, W.P.; Read, P.E.; Skilling, D.D. 1986. Somaclonal variation and development of resistance to *Septoria musiva* in hybrid *Populus*. In: *22d International Horticultural Congress and 83d annual meeting of the American Society of Horticultural Science*; 1986 August 10-18; Davis, CA. *HortScience*. 21(3): 706. Abstract.
- Ettinger, T.L.; Ostry, M.E.; Hackett, W.P.; Read, P.E.; Skilling, D.D. 1986. Utilization of somaclonal variation in the development of *Septoria musiva* - resistant hybrid *Populus*. In: Somers, D.A.; Gengenbach, B.G.; Biesboer, D.D.; et al., eds. *Proceedings, 6th International congress of plant tissue and cell culture*; 1986 August 3-8; Minneapolis, MN. Minneapolis, MN: University of Minnesota: 214. Abstract.
- Fillatti, J.J.; Sellmer, J.C.; McCown, B.H. 1986. Regeneration and transformation of *Populus*. In: Somers, D.A.; Gengenbach, B.G.; Biesboer, D.D.; et al., eds. *Proceedings, 6th International congress of plant tissue and cell culture*; 1986 August 3-8; Minneapolis, MN. Minneapolis, MN: University of Minnesota: 127. Abstract.
- Fillatti, JoAnne J.; Sellmer, James C.; McCown, Brent H. 1986. Regeneration and transformation of *Populus* tissue. *HortScience*. 21(3): 773. Abstract.
- Fillatti, J.J.; McCown, B.H.; Sellmer, J.; Haissig, B. 1986. The introduction and expression of a gene conferring tolerance to the herbicide glyphosate in *Populus NC5339*. In: *1986 research and development conference: TAPPI proceedings*; 1986 September 28-October 1; Raleigh, NC. Atlanta, GA: TAPPI Press: 63-85.

- Fillatti, JoAnne J.; Haissig, Bruce; McCown, Brent; Comai, Luca; Riemenschneider, Don. 1986. **Development of glyphosate-tolerant Populus plants through expression of a mutant aroA gene from *Salmonella typhimurium***. In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 243-264.
- Fillati, J.J.; Sellmer, J.; McCown, B.; Haissig, B.; Comai, L. 1987. **Agrobacterium mediated transformation and regeneration of Populus**. Molecular and General Genetics. 206: 192-199.
- Fillatti, J.J.; Sellmer, J.; McCown, B.; Haissig, B.; Comai, L.; Riemenschneider, D. 1988. **The development of glyphosate-tolerant Populus plants through expression of a mutant aroA gene from *Salmonella typhimurium***. In: Cheliak, W.M.; Yapa, A.C., eds. Biotechnology in energy forestry: IEA symposium abstracts. Inf. Rep. PI-X-84. Chalk River, Ontario, Canada: Petawawa National Forestry Institute: 18-21.
- Haissig, B.E. 1986. **Tissue culture-based biotechnology for Populus clones**. In: Klass, Donald L., ed. Proceedings, 10th Annual symposium on energy from biomass and wastes; 1986 April 7; Washington, DC. Chicago, IL: Institute of Gas Technology: 155-176.
- Haissig, B.E.; Riemenschneider, D.E. 1987. **Genetic engineering of hybrid poplars for herbicide tolerance**. In: Proceedings, Forest products research conference, matching utilization research with the needs of timber managers; 1986 October 21-23; Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory: 37-46.
- Heuchelin, S.A.; McNabb, H.S., Jr.; Klopfenstein, N.B.; Thornburg, R.W. 1990. **Agrobacterium mediated transformation of *Populus x euramericana* 'Ogy' using the proteinase inhibitor II gene (pin 2) to increase pest resistance**. Phytopathology. 80: 976. Abstract.
- Hubbes, M. 1990. **Development of biotechnology programmes for energy forestry**. Biomass. 22(1-4): 75-89.
- Klimaszewska, K.; Cheliak, W.M. 1988. **Selection for glyphosate-tolerant cell cultures in poplar**. In: Ferm, A., ed. Proceedings of the International Energy Agency Task 2 meeting and workshops on cell culture and coppicing; 1987 August 24-29; Oulu, Finland. Finland: Metsantatkimus-laitoken Tiedonantoja. 304: 17-23.
- Klopfenstein, N.B.; Heuchelin, S.A.; McNabb, H.S., Jr.; Thornburg, R.W.; Hall, R.B.; Hart, E.R. 1989. **Transformation of hybrid Populus with the proteinase inhibitor II gene**. Phytopathology. 79(9): 1004. Abstract.
- Klopfenstein, N.B.; Chun, Y.W.; McNabb, H.S., Jr.; Hall, R.B.; Hart, E.R.; Schultz, R.C.; Thornburg, R.W. 1987. **Toward transformation of Populus species by Agrobacterium binary vector systems**. In: Hanover, James W.; Keathley, David E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 474. Abstract.
- Kriebel, H.B. 1989. **Biotechnology and forestry**. AgBiotech News and Information. 1(1): 33-36.
- Larkin, P.J.; Banks, P.M.; Bhati, R.; Brettell, R.I.S.; Davies, P.A.; Ryan, S.A.; Scowcroft, W.R.; Spindler, L.H.; Tanner, G.J. 1989. **From somatic variation to variant plants: mechanisms and applications**. Genome. 31(2): 705-711.
- Layton, Patricia A.; Ostry, Michael E. 1989. **Biotechnology and poplars: a U.S. perspective**. In: Proceedings of the International Energy Agency Task 2 joint workshop: willow breeding and biotechnology development; 1988 September 28-October 6; Bristol, U.K.: University of Bristol: 135-139.

- Lester, D.T.; Berbee, J.G. 1977. Within-clone variation among black poplar trees derived from callus culture. *Forest Science*. 23(1): 122-131.
- Michel, M.F.; Delmotte, F.; Depierreux, C. 1988. Transformation of hybrid *Populus tremula* x *P. alba* by *Agrobacterium tumefaciens*. In: Ahuja, M.R., ed. Proceedings of the IUFRO Working Party S2.04-07: somatic cell genetics of woody plants; 1987 August 10-13; Grosshansdorf, Federal Republic of Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 81. Abstract.
- Michler, C.H.; Bauer, E. 1987. Selection for herbicide tolerance in *Populus* to sulfometuron methyl in vitro. In: Hanover, James W.; Keathley, Daniel E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 479-480. Abstract.
- Michler, C.; Bauer, E. 1987. Selection of somaclonal variants for herbicide tolerance in tissue cultured plantlets of *Populus*. *In Vitro Cellular and Developmental Biology*. 23(3): 47. Abstract.
- Michler, C.H.; Bauer, E.O. 1988. Somaclonal variants of poplar that tolerate sulfometuron methyl. *In Vitro*. 24(3) Part 2: 52A. Abstract.
- Michler, C.H.; Bauer, E.O. 1990. Biochemical mechanism of herbicide tolerance of in vitro selected *Populus*. *In Vitro Cellular and Developmental Biology*. 26(3) Part 2: 47A. Abstract.
- Michler, C.H.; Haissig, B.E. 1988. Increased herbicide tolerance of in vitro selected hybrid poplar. In: Ahuja, M.R., ed. Proceedings of the IUFRO Working Party S2.04-07 somatic cell genetics of woody plants; 1987 August 10-13; Grosshansdorf, Federal Republic of Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 183-189.
- Michler, C.H.; Voelker, T.M.; Bauer, E.O. 1989. Production of putative herbicide tolerant plants from somatic embryos regenerated from in vitro selected callus. *In Vitro*. 25(3): 62. Abstract.
- Nelson, N.D.; Haissig, B.E. 1984. Biotechnology in the Forest Service's North Central Forest Experiment Station. In: Proceedings, International symposium of recent advances in forest biotechnology; 1984 June 10-13; Traverse City, MI. East Lansing, MI: Michigan Biotechnology Institute: 139-154.
- Noh, Eun Woon. 1987. *Tissue culture and genetic transformation of forest trees*. Durham, NH: University of New Hampshire. 124 p. M.S. thesis.
- Noh, Eun Woon; Minocha, Subhash C. 1990. Pigment and isozyme variation in aspen shoots regenerated from callus culture. *Plant Cell, Tissue and Organ Culture*. 23: 39-44.
- Ostry, M.E. 1987. Application of biotechnology for the development of disease-resistant poplars. In: Lin, D.; Hubbes, M.; Zsuffa, L., comps. Proceedings of the IEA/BA task 2 workshop: biotechnology development; 1987 September 1; Uppsala, Sweden. Inf. Rep. 88:1. Toronto, Canada: University of Toronto, Centre for Plant Biotechnology: 13-27.
- Ostry, M.E.; Skilling, D.D. 1987. Somaclonal variation for disease resistance in forest trees. In: Hanover, James W.; Keathley, David E., eds. Proceedings, Conference on genetic manipulation of woody plants; 1987 June 21-25; East Lansing, MI. New York, NY: Plenum Press (Basic Life Science): 482. Abstract.
- Ostry, M.E.; Skilling, D.D. 1987. Somaclonal variation in hybrid poplars for resistance to *Septoria leaf spot*. In: Proceedings of the 5th North central tree improvement conference; 1987 August 10-12; Fargo, ND. Madison, WI: University of Wisconsin-Madison, Department of Forestry: 89-100.

- Ostry, M.E.; Skilling, D.D. 1988. **Somatic variation in resistance of *Populus* to *Septoria musiva*.** Plant Disease. 72(8): 724-727.
- Ostry, M.E.; Skilling, D.D. 1988. **Use of tissue culture and *in vitro* bioassays for the development and selection of disease-resistant trees.** Phytopathology. 78(12): 1608. Abstract.
- Ostry, M.E.; Ettinger, T.L.; Hackett, W.P.; Read, P.E.; Skilling, D.D. 1986. **Development of bioassays to identify variant *Populus* cells and regenerated plants resistant to *Septoria musiva*.** In: Somers, D.A.; Gengenbach, B.G.; Biesboer, D.D.; et al., eds. Proceedings of the 6th International congress of plant tissue and cell culture; 1986 August 3-8; Minneapolis, MN. Minneapolis, MN: University of Minnesota: 303. Abstract.
- Parsons, Thomas J.; Sinkar, Vilas P.; Stettler, Reinhard F.; Nester, Eugene W.; Gordon, Milton P. 1986. **Transformation of poplar by *Agrobacterium tumefaciens*.** Bio/Technology. 4: 533-536.
- Prakash, C.S.; Thielges, B.A. 1989. **Somaclonal variation in Eastern cottonwood for race-specific partial resistance to leaf rust disease.** Phytopathology. 79(7): 805-808.
- Pythoud, Francois; Sinkar, Vilas P.; Nester, Eugene W.; Gordon, Milton P. 1987. **Increased virulence of *Agrobacterium rhizogenes* conferred by the *vir* region of pTiBo542: application to genetic engineering of poplar.** Bio/Technology. 5: 1323-1327.
- Riemenschneider, D.E.; Haissig, B.E.; Sellmer, J.; Fillatti, J.J. 1988. **Expression of an herbicide tolerance gene in young plants of a transgenic hybrid poplar clone.** In: Ahuja, M.R., ed. Proceedings of the IUFRO Working Party S2.04-07 somatic cell genetics of woody plants; 1987 August 10-13; Grosshansdorf, Federal Republic of Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 73-80.
- Russell, Julie A.; McCown, Brent H.; McCabe, Dennis E. 1989. **Cell monolayers as an aid to the study of biological factors affecting biotic transformation.** In: Proceedings of the Annual meeting of the American Society of Plant Physiologists/Canadian Society of Plant Physiologists; 1988 July 30-August 3; Toronto, Canada. Rockville, MD: American Society of Plant Physiologists: 13. Abstract.
- Sellmer, J.C.; McCown, B.H. 1986. **A selection system for increased recovery of transformed shoots regenerated from *Populus* leaf tissue.** In: Somers, D.A.; Gengenbach, B.G.; Biesboer, D.D.; et al., eds. Proceedings, 6th International congress of plant tissue and cell culture; 1986 August 3-8; Minneapolis, MN. Minneapolis, MN: University of Minnesota: 154. Abstract.
- Sellmer, J.C.; McCown, B.H. 1989. **Transformation in *Populus* spp.** In: Bajaj, Y.P.S., ed. Biotechnology in agriculture and forestry: Plant protoplasts and genetic engineering 2. Springer-Verlag Berlin. 9: 155-172.
- Sellmer, James C.; Russell, Julie A.; Zeldin, Eric L.; McCown, Brent H. 1985. **Utilization of cytokinin response curves in tissue evaluation of *Populus* for biotechnology research.** HortScience. 20(3): 593. Abstract.
- Skilling, Darroll D.; Ostry, Michael E. 1986. **Biotechnologies—the potential role of somaclonal variation in forestry.** In: IUFRO proceedings: Evaluation and planning of forestry research; 1985 July 25-26; Fort Collins, CO. Gen. Tech. Rep. NE-111. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 17-19.
- Steenackers, M. 1988. **Breeding poplars for rust resistance: recent advances.** Mededelingen van de Faculteit Landbouwweten. Schappen, Rijksuniversiteit Gent. Rijkssta. Populierenteelt, Geraardsbergen, Belgium. 53(2a): 417-422.

Valentine, Fredrick A. 1989. **Biotechnology and breeding disease resistant poplar clones.** In: Proceedings of the International Energy Agency Task 2 joint workshop: willow breeding and biotechnology development; 1988 September 28-October 6; Bristol, U.K.: University of Bristol: 112-127.

CELL AND CHEMICAL PROPERTIES

Feirer, R.P.; Wann, S.R.; Einspahr, D.W. 1985. **The effects of spermidine synthesis inhibitors on in-vitro plant development.** Plant Growth Regulator. 3: 319-327.

Fukuda, Tadanori. 1976. **Studies on tissue culture of tree-cambium. 6. Formation of lignin in poplar callus in suspension culture.** Japan Wood Research Society Journal. 22(11): 638-643.

Fukuda, Tadanori. 1978. **Studies on tissue culture of tree-cambium. 7. Sugar composition of cell wall polysaccharides of suspension-cultured poplar cells.** Japan Wood Research Society Journal. 24(10): 677-682.

Fukuda, Tadanori; Kanda, Takashi. 1976. **Studies on tissue culture of tree-cambium. 3. Separation of lignin-carbohydrate-protein complex from poplar callus tissue.** Japan Wood Research Society Journal. 22(2): 112-118.

Fukuda, Tadanori; Kanda, Takashi. 1976. **Studies on tissue culture of tree-cambium. 4. On the chemical compositions of lignin-carbohydrate-protein complex in poplar callus tissue.** Japan Wood Research Society Journal. 22(10): 564-569.

Fukuda, Tadanori; Tomimura, Yooiti. 1976. **Studies on tissue culture of tree-cambium. 5. Enzymic hydrolysis of lignin-carbohydrate-protein complex in poplar cambium tissue.** Japan Wood Research Society Journal. 22(10): 570-574.

Fukuda, Tadanori; Oota, Michiko; Terashima, Noritsuga; Kanda, Takashi. 1975. **Studies on tissue culture of tree-cambium. 2. On the physical and chemical properties of lignin from poplar callus tissue.** Japan Wood Research Society Journal. 21(3): 157-163.

Hoffman, A., Sr.; Miller, A.R.; Pengelly, W.L. 1985. **Characterization of polyphenols in cell walls of cultured *Populus trichocarpa* tissues.** Phytochemistry. 24(11): 2685-2687.

Kubackova, Marta; Karacsonyi, Stefan; Bilisics, Ladislav; Liskova, Desana; Janecek, Frantisek. 1981. **Chemical composition of the tissue culture cell walls of poplar (*Populus alba* L. 'Pyramidalis') during its growth.** Drevarsky Vyskum. 26(2): 1-17.

Kubackova, Marta; Karacsonyi, Stefan; Bilisics, Ladislav; Zakutna, Libusa; Blanarikova, Vitoslava. 1982. **Chemical constitution and structure of tissue culture cell walls of poplar (*Populus alba* L. 'Pyramidalis').** Drevarsky Vyskum. 27(1): 1-20.

Mathes, M.C.; Einspahr, D.W.; Winton, L.L. 1970. **Chemical composition of callus tissue and juvenile stems from aspen species.** Institute of Paper Chemistry. No. 8. Genetica Physiologia. 9 p.

Mathes, M.C.; Helton, E.D.; Fisher, K.D. 1971. **The production of microbial-regulatory materials by isolated aspen tissue.** Plant and Cell Physiology. 12: 593-601.

Simson, B.W.; Timell, T.E. 1978. **Polysaccharides in cambial tissues of *Populus tremuloides* and *Tilia americana*. 5. Cellulose.** Cellulose Chemistry and Technology. 12(2): 137-141.

Venverloo, Catharina J. 1969. **The lignin of *Populus nigra* L. cv. 'Italica': A comparative study of the lignified structures in tissue cultures and the tissues of the tree.** Acta Botanica Neerlandica. 18(2): 241-315.

- Wolter, Karl E.; Gordon, John C. 1975. **Peroxidases as indicators of growth and differentiation in aspen callus cultures.** Physiological Plantarum. 33: 219-223.
- Wolter, Karl E.; Harkin, John M.; Kirk, T. Kent. 1974. **Guaiacyl lignin associated with vessels in aspen callus cultures.** Physiological Plantarum. 31: 140-143.
- Xu, Gui-fang; Niu, Yu-xian; Tang, Ding-tai; Zhang, Jing-lan. 1983. **The relationships between activities of indoleacetic acid oxidase, peroxidase and isoenzymes in four kinds of calli.** Acta Botanica Sinica. 25(6): 551-555.
- POST-CULTURE PERFORMANCE**
- Burkot, T.R.; Benjamin, D.M. 1977. **The bionomics of the cottonwood leaf beetle, *Chrysomela scripta* Fab., on tissue culture hybrid poplars.** In: Proceedings of the 13th Lake States forest tree improvement conference; 1977 August 17-18; St. Paul, MN. Gen. Tech. Rep. NC-50. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 131-135.
- Burkot, T.R.; Benjamin, D.M. 1979. **The biology and ecology of the cottonwood leaf beetle, *Chrysomela scripta* (Coleoptera: Chrysomelidae) on tissue-cultured hybrid Aigeiros (*Populus x euramericana*) subclones in Wisconsin.** The Canadian Entomologist. 111(5): 551-556.
- Chalupa, V. 1976. **The use of regenerants from tissue culture of forest trees in tree breeding.** In: Novak, F.J., ed. Vyuziti kultur rostlinnych explantaty ve slechteni: sbornik mezinarodniho symposia; 1976 January 6-11; Olomouc, CSSR: 183-193.
- Chardenon, J.; Taris, B. 1960. **Remarques sur la structure des tissus neoformes et l'apparition d'organes specialises chez quatre cultivars de *Populus* et chez *Salix alba*, cultives in vitro.** C.R. Academy of Science, Paris. 251: 2070-2071.
- Chun, Young Woo; Hall, Richard B. 1984. **Survival and early growth of *Populus alba* x *P. grandidentata* in vitro culture plantlets in soil.** Journal of Korean Forestry Society. 66: 1-7.
- Cousin, M.T.; Roux, J.; Millet, N.; Michel, M.F. 1990. **Maintenance of MLOs (mycoplasma-like organisms) on *Populus alba* micro-propagation.** Journal of Phytopathology. 130: 17-23.
- Harrell, M.O.; Benjamin, D.M.; Berbee, J.G.; Burkot, T.R. 1982. **Consumption and utilization of leaf tissue of tissue-cultured *Populus x euramericana* by the cottonwood leaf beetle *Chrysomela scripta*.** The Canadian Entomologist. 114(8): 743-749.
- Heslin, M.C.; Douglas, G.C. 1986. **Effects of ectomycorrhizal fungi on growth and development of poplar plants derived from tissue culture.** Scientia Horticulturae. 30: 143-149.
- Lindgren, D.T.; Russell, J.A.; McCown, B.H. 1988. **Greenhouse and field evaluation of protoplast-derived *Populus* trees.** HortScience. 23(3): 759. Abstract.
- Schulzke, R. 1987. **First experience in practical forestry with aspen propagated by tissue culture techniques.** Die Holzzucht. 41(3-4): 34-36.
- Zhao, H.Z.; Zhang, L.X. 1988. **A study on raising the hard-to-root cuttings of poplars on cellar type hotbeds.** Forest Science and Technology. 11: 7-9.

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