

TIMOTHY J. TSCHAPLINSKI

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RESEARCH INTERESTS

Plant physiologist experienced in biochemistry, specifically the application of mass spectrometry to research problems in genomics, bioenergy crop production, environmental stress physiology, and signaling. Current research includes metabolomics for phenotypic characterization of *Populus* and *Arabidopsis*, and the application of genomic tools for the accelerated domestication of *Populus*, including increasing the drought tolerance of *Populus* to increase biomass productivity on marginal sites, and manipulating metabolite production for increased carbon sequestration potential and bioproduct formation.

POSITIONS

2007-present	Distinguished Research Staff , Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN
2004-present	Adjunct Faculty , UT-ORNL Genome Science & Technology Graduate School University of Tennessee, Knoxville, TN
2003-present	Adjunct Full Professor , Department of Plant Sciences University of Tennessee, Knoxville, TN
2002-2006	Senior Scientist , Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN
1995-1997	Adjunct Professor , Institute of Agriculture University of Tennessee, Knoxville, TN
1990-2002	Research Staff , Environmental Sciences Division, ORNL, Oak Ridge, TN
1987-1990	Postdoctoral Research Associate , Environmental Sciences Division Oak Ridge National Laboratory, Oak Ridge, TN
1986	Lecturer , Tree Physiology, University of Toronto, Toronto, Canada

EDUCATION

1982-87	Ph.D. Forestry - University of Toronto, Toronto, Ontario, Canada
1980-82	M.Sc. Forestry - University of Toronto, Toronto, Ontario, Canada
1976-80	B.Sc. Biology - Carleton University, Ottawa, Ontario, Canada

PUBLICATIONS - 60 total

Yang, X., U. C. Kalluri, S.P. DiFazio, S.D. Wullschleger, T.J. Tschaplinski, Z.-M. Cheng, and G.A. Tuskan. 2009. Poplar Genomics: State of the Science. Critical Reviews in Plant Sci. (in press)

Chen, F., C.-J. Liu, T.J. Tschaplinski, and N. Zhao. 2009. Genomics of secondary metabolism in *Populus*: Interactions with biotic and abiotic environments. Critical Reviews in Plant Sci. (in press)

Yang, S.-J., I. Kataeva, S.D. Hamilton-Brehm, N.L. Engle, T.J. Tschaplinski, C. Doeppke, M. Davis, J. Westpheling, and M.W.W. Adams. 2009. Efficient degradation of lignocellulosic plant

biomass without pretreatment by the 9 thermophilic anaerobe, *Anaerocellum thermophilum* DSM 6725. *Appl. Environ. Microbiol.* 75:4762-4769.

Jung, H.W., T.J. Tschaplinski, L. Wang, J. Glazebrook, and J.T. Greenberg. 2009. Priming in systemic plant immunity. *Science* 324:89-91.

Zhao, N., J. Guan, F. Forouhar, T. J. Tschaplinski, Z.-M. Cheng, L. Tong, and F. Chen. 2009. Two poplar methyl salicylate esterases display comparable biochemical properties but divergent expression patterns. *Phytochemistry* 70:32-39.

Yang, X., S. Jawdy, T.J. Tschaplinski, and G.A. Tuskan. 2009. Genome-wide identification of lineage-specific genes in *Arabidopsis*, *Oryza* and *Populus*. *Genomics* 93:473-480.

Yang, S., T.J. Tschaplinski, N.L. Engle, S.L. Carroll, S.L. Martin, B.H. Davison, A.V. Palumbo, and S.D. Brown. 2009. Transcriptomic and metabolomic profiling of *Zymomonas mobilis* oxygen stress responses. *BMC Genomics* 10:34 (online)

Yang, X., U.C. Kalluri, S. Jawdy, L.E. Gunter, T.-M. Yin, T.J. Tschaplinski, D. Weston, P. Ranjan, and G.A. Tuskan. 2008. Comparative analysis of F-box proteins in *Arabidopsis*, *Populus* and rice suggests differential proteolytic roles in woody perennial and herbaceous annual plants. *Plant Physiology* 148:1189-1200.

Morse, A.M., T.J. Tschaplinski, C. Dervinis, P.M. Pijut, E.A. Schmelz, W. Day, and J.M. Davis. 2007. A salicylate hydroxylase transgene in poplar induces compensatory mechanisms in the shikimate and phenylpropanoid pathways. *Phytochemistry* 68:2043-2052.

Davison, B.H., A.J. Ragauskas, R. Templer, T.J. Tschaplinski, and J.R. Mielenz. 2006. Measuring the Efficiency of Biomass Energy – Response. *Science* 312:1744-1745.

A.J. Ragauskas, C.K. Williams, B.H. Davison, G. Britovsek, J. Cairney, C.A. Eckert, J. Frederick, J.P. Hallett, D. Leak, C.L. Liotta, J.R. Mielenz, R. Murphy, R. Templer, and T. Tschaplinski. 2006. The path forward for biofuels and biomaterials. *Science* 27:484-489.

Tsai, C.-J., S.A. Harding, T.J. Tschaplinski, R.L. Lindroth, and Y. Yuan. 2006. Genome-wide analysis of the structural genes regulating defense phenylpropanoid metabolism in *Populus*. *New Phytol.* 172:47-62.

Busov, V., Meilan, R., Pearce, D., Rood, S., Ma, C., Tschaplinski, T., and S. Strauss. 2006. Transgenic modification of *gai* or *rgl1* causes dwarfing and alters gibberellins, root growth, and metabolite profiles in *Populus*. *Planta* 224:288-299.

Norby, R.J., S.D. Wullschleger, P.J. Hanson, C.A. Gunderson, T.J. Tschaplinski and J. D. Jastrow. 2006. CO₂ enrichment of a deciduous forest: The Oak Ridge FACE Experiment. pp. 231-251. In Nösberger J., Long S.P., Norby R.J., Stitt M., Hendrey G.R., Blum H. (eds.) *Managed ecosystems and CO₂: Case Studies, Processes and Perspectives*. Ecological Studies, Vol. 187. Springer, Berlin. 459 p.

Davis, M.F., G.A. Tuskan, M.M. Payne, T.J. Tschaplinski and R. Meilan. 2006. Assessment of *Populus* wood chemistry following the introduction of a Bt toxin gene. *Tree Physiol.* 26:557-564.

Tschaplinski, T., G.A. Tuskan, M.M. Sewell, G.M. Gebre, D.E. Todd and C.D. Pendley. 2006. Phenotypic variation and QTL identification for osmotic potential in an interspecific hybrid inbred F₂ poplar pedigree growing under contrasting environments. *Tree Physiol.* 26:595-604.

Wullschleger, S.D., T.M. Yin, S.P. DiFazio, T.J. Tschaplinski, L.E. Gunter, M.F. Davis, and G.A. Tuskan. 2005. Phenotypic variation in growth and biomass distribution for two advanced-generation pedigrees of hybrid poplar. *Can. J. For. Res.* 35:1779-1789.

Hanson, P.J., S.D. Wullschleger, R.J. Norby, T.J. Tschaplinski and C.A. Gunderson. 2005. Importance of changing CO₂, temperature, precipitation, and ozone on carbon and water cycles of an upland oak forest: Incorporating experimental results into model simulations. *Global Change Biol.* 11:1402-1423.

Tschaplinski, T.J. and P.J. Hanson. 2003. Dormant season nonstructural carbohydrate storage. In P.J. Hanson and S.D. Wullschleger (eds.). *North American Temperate Deciduous Forest Response to Changing Precipitation Regimes*. Springer, New York, pp. 67-84.

Tschaplinski, T.J. and G.M. Gebre. 2003. Leaf water potential, osmotic potential, and solute potential of several hardwood species as affected by manipulation of throughfall precipitation in an upland oak forest. In P.J. Hanson and S.D. Wullschleger (eds.). *North American Temperate Deciduous Forest Response to Changing Precipitation Regimes*. Springer, New York, pp. 121-139.

Hanson, P.J., N.T. Edwards, T.J. Tschaplinski, S.D. Wullschleger and J.D. Joslin. 2002. Estimating the net primary and net ecosystem production of a southeastern upland *Quercus* forest from an 8-year biometric record. In P.J. Hanson and S.D. Wullschleger (eds.). *North American Temperate Deciduous Forest Response to Changing Precipitation Regimes*. Springer, New York, pp. 378-395.

Edwards, N.T., T.J. Tschaplinski and R.J. Norby. 2002. Respiration responses in stems of mature sweetgum trees to CO₂ enrichment. *New Phytol.* 155:239-248.

Wullschleger, S.D., T.J. Tschaplinski, and R.J. Norby. 2002. Plant water relations at elevated CO₂ – interactions with drought. *Plant, Cell and Environ.* 25:319-331.

Gebre, G.M., and T.J. Tschaplinski. 2002. Solute accumulation of chestnut oak and dogwood leaves in response to throughfall manipulation of an upland oak forest. *Tree Physiol.* 22:251-260.

Norby, R.J., P.J. Hanson, E.G. O'Neill, T.J. Tschaplinski, J.F. Weltzin, R.T. Hansen, W. Cheng, S.D. Wullschleger, C.A. Gunderson, N.T. Edwards, and D.W. Johnson. 2002. Net primary productivity of a CO₂-enriched deciduous forest and the implication for carbon storage. *Ecol. Appl.* 12:1261-1266.

Paez, A., G.M. Gebre, M.E. Gonzalez, and T.J. Tschaplinski. 2000. Growth, soluble carbohydrates, and aloin concentration of *Aloe vera* plants exposed to three irradiance levels. *Environ. and Exp. Bot.* 44:133-139.

Tschaplinski, T.J., G.A. Tuskan, G.M. Gebre, and D.E. Todd. 1998. Drought resistance of two hybrid *Populus* clones grown under irrigation in large-scale plantations. *Tree Physiol.* 18:653-658.

Gebre, G.M., T.J. Tschaplinski, G.A. Tuskan, and D.E. Todd. 1998. Clonal and seasonal differences in leaf osmotic potentials and organic solutes of five hybrid poplar clones grown under field conditions. *Tree Physiol.* 18:645-652.

Tschaplinski, T.J., G.M. Gebre, and T.L. Shirshac. 1998. Osmotic potential of several hardwood species as affected by throughfall manipulation of an upland oak forest during a dry year. *Tree Physiol.* 18:291-298.

Gebre, G.M., T.J. Tschaplinski, and T.L. Shirshac. 1998. Response in water relations of several hardwood species to throughfall manipulation in an upland oak forest during a wet year. *Tree Physiol.* 18:299-305.

Wullschleger, S.D., P.J. Hanson, and T.J. Tschaplinski. 1998. Whole-plant water flux in understory red maple exposed to altered precipitation regimes. *Tree Physiol.* 18:71-79.

Blake, T.J., J. Sperry, T.J. Tschaplinski, and S.S. Wang. 1997. Water relations. In Stettler, R.F., H.D. Bradshaw, P.E. Heilman, and T.M. Hinckley (eds.). *Biology of Poplar*. Natural Sciences and Research Council of Canada, Ottawa, Canada, pp. 401-422.

Land, S.B., A.W. Ezell, S.H. Schoenholtz, G.A. Tuskan, T.J. Tschaplinski, R.C. Kellison, M. Stine, and H.D. Bradshaw. 1997. Intensive culture of cottonwood and hybrid poplar. LSU Press.

Tschaplinski, T.J., D.B. Stewart, and R.J. Norby. 1995. Interactions between drought and elevated CO₂ on osmotic adjustment and solute concentrations of tree seedlings. *New Phytol.* 131:169-177.

Tschaplinski, T.J., G.M. Gebre, J.E. Dahl, G.T. Roberts, and G.A. Tuskan. 1995. Growth and solute adjustment of calli of *Populus* clones cultured on nutrient media containing polyethylene glycol. *Can. J. For. Res.* 25:1425-1433.

Tschaplinski, T.J., and T.J. Blake. 1995. Carbohydrate status of coppice shoots of hybrid poplar following shoot pruning. *Tree Physiol.* 15:333-338.

Tschaplinski, T.J., D.B. Stewart, P.J. Hanson, and R.J. Norby. 1995. Interactions between water stress and elevated CO₂ on growth and gas exchange of seedlings of three deciduous tree species. *New Phytol.* 129:63-71.

Tschaplinski, T.J., and L.L. Wright. 1994. Woody plant research of the biofuels feedstock development program. *Biologue* 12:32-35.

Tschaplinski, T.J., G.A. Tuskan, and C.A. Gunderson. 1994. Water-stress tolerance of black cottonwood and eastern cottonwood clones and four of their hybrid progeny. I. Growth, water relations and gas exchange. *Can. J. For. Res.* 24:346-371.

Tschaplinski, T.J., and G.A. Tuskan. 1994. Water-stress tolerance of black cottonwood and eastern cottonwood clones and four of their hybrid progeny. II. Metabolites and inorganic ions that constitute osmotic adjustment. *Can. J. For. Res.* 24:681-687.

Van Miegroet, H., R.J. Norby, and T.J. Tschaplinski. 1994. Optimum nitrogen fertilization in a short-rotation sycamore plantation. *For. Ecol. and Manage.* 64:13-24.

Tschaplinski, T.J., and T.J. Blake. 1994. Carbohydrate mobilization following shoot defoliation and decapitation in hybrid poplar. *Tree Physiol.* 14:141-151.

Tschaplinski, T.J., R.J. Norby, and S.D. Wullschleger. 1993. Responses of loblolly pine seedlings to elevated CO₂ and fluctuating water supply. *Tree Physiol.* 13:283-296.

Tschaplinski, T.J., and R.J. Norby. 1993. Physiological indicators of nitrogen response in short rotation sycamore plantations. II. Nitrogen metabolism. *Can. J. Bot.* 71:841-847.

Marland, G., V. Dale, R. Graham, R. Luxmoore, S. Marland, S. McLaughlin, R. Norby, W. M. Post, T. Tschaplinski, J. Tuskan, and L. Wright. 1993. Forest management for fixing and sequestering carbon. Proceedings of the Second U.S./Japan Workshop on Global Change Research: Environmental Response Technologies (Mitigation and Adaptation). Honolulu, Hawaii, U.S.A., Feb. 1-3, 1993. pp. 265-269.

D'Surley, S.J., T.J. Tschaplinski, N.T. Edwards, and L.R. Shugart. 1993. Biological responses of two soybean cultivars exposed to enhanced UVB radiation. *Environ. and Exp. Bot.* 33:1-10.

Blake, T.J., and T.J. Tschaplinski. 1992. Water relations. In P.C. Mitchell, L. Sennerby-Forsse, and T. M. Hinckley (eds.). *Ecophysiology of Short Rotation Forest Crops*. Elsevier, Amsterdam. pp. 66-94.

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Tschaplinski, T.J., and R.J. Norby. 1991. Physiological indicators of nitrogen response in short rotation sycamore plantations. I. CO₂ assimilation, photosynthetic pigments, and soluble carbohydrates. *Physiol. Plant.* 82:117-126.

Grossnickle, S.C., J.T. Arnott, J.E. Major, and T.J. Tschaplinski. 1991. Dormancy induction treatment influence on western hemlock seedlings. I. Seedling development and stock quality assessment. *Can. J. For. Sci.* 21:164-174.

Tschaplinski, T. J., D. W. Johnson, R. J. Norby, and D. E. Todd. 1991. Biomass and soil nitrogen relationships of a one-year-old sycamore plantation. *Soil Sci. Am. J.* 55:841-847.

McCarthy, J.F., and T.J. Tschaplinski. 1991. Biological markers in animals and plants to establish exposure to, and effects of, atmospheric toxicants. In T. J. Moser, J. R. Baker, and D. T. Tingey (eds.). *Ecolgical Exposure and Effects of Airborne Toxic Chemicals: An Overview*. U.S. Protection Agency, Corvallis, OR. Report No. 600/3-91/001, pp. 107-127.

Tschaplinski, T.J., and T.J. Blake. 1989. Water relations, photosynthetic capacity, and root/shoot partitioning of photosynthate as determinants of productivity in hybrid poplar. *Can. J. Bot.* 67:1689-1697.

Tschaplinski, T.J., and T.J. Blake. 1989. Correlation between early root production, carbohydrate metabolism, and biomass production in hybrid poplar. *Can. J. Bot.* 67:2168-2174.

Tschaplinski, T.J., and T.J. Blake. 1989. Water stress tolerance and late-season organic solute

- accumulation in hybrid poplar. Can. J. Bot. 67:1681-1688.
- Tschaplinski, T.J., and T.J. Blake. 1989. Photosynthetic reinvigoration following shoot decapitation, and accelerated growth of coppice shoots. Physiol. Plant. 75:157-165.
- Tschaplinski, T.J., and T.J. Blake. 1989. The role of sink demand in carbon partitioning and photosynthetic reinvigoration following shoot decapitation. Physiol. Plant. 75:166-173.
- Blake, T.J., and T.J. Tschaplinski. 1986. The role of water relations and photosynthesis in the early reinvigoration of decapitated poplar hybrids. Physiol. Plant. 68:287-293.
- Tschaplinski, T.J., and T.J. Blake. 1985. Effects of root restriction on growth correlations, water relations, and senescence of alder seedlings. Physiol. Plant. 64:167-176.
- Blake, T.J., T.J. Tschaplinski, and A. Eastham. 1984. Stomatal control of water use efficiency in poplar clones and hybrids. Can. J. Bot. 62:1344-1351.

THESES

- Ph.D. Physiological correlates of vigorous growth in hybrid poplar.
- M.Sc.F. The effects of root restriction on growth, water relations and senescence of European alder (*Alnus glutinosa* Gaertn.) seedlings.
- B.Sc. The age composition of a collection of rabid and nonrabid Big Brown Bats (*Eptesicus fuscus*) as determined by dental annuli.

PROFESSIONAL SOCIETIES/ACTIVITIES

- DOE 30x30 Workshop on Biomass Energy – Woody Crop Development panel member (2006)
Southeast Regional Biomass Consortium – Lead of Woody Crop Development (2006)
International Poplar Genome Consortium – Coordinator of the Metabolic Characterization and Metabolomics section of the Science Plan for post-genome sequencing research
Environmental and Experimental Botany – member of Editorial Board (2002 – present)
Tree Physiology – member of Editorial Review Board (1994 – present)
Bioactive Natural Products Consortium – University of Tennessee – member (2002 – present)
National Science Foundation – member of Major Research Instruments Panel (1998)
US DOE rep. to the International Energy Agency Ecophysiology Working Group (1989-1993)
American Society of Plant Physiologists – member/participant
Canadian Society of Plant Physiologists – member/participant
Ecological Society of America – participant
Sigma Xi – member/participant

SCHOLARSHIPS

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|------|---|
| 1985 | Canadian Forestry Service Scholar Scholarship |
| 1984 | Natural Sciences & Engineering Research Council Postgraduate Scholarship – Forestry Special |
| 1983 | Natural Sciences and Engineering Research Council Postgraduate Scholarship |
| 1982 | Natural Sciences and Engineering Research Council Postgraduate Scholarship |
| 1982 | Edward Elsworth Johnson Postgraduate Forestry Fellowship |
| 1981 | University of Toronto Open Master's Fellowship |
| 1980 | Canadian National Sportsmen's Fellowship |
| 1980 | Natural Sciences and Engineering Research Council Summer Research Award |