

Gerald A. Tuskan

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EDUCATION

Ph.D. - 1984 - Genetics, Texas A&M University
M.S. - 1980 - Forest Genetics, Mississippi State University
B.S. - 1978 - Forest Management, Northern Arizona University

PROFESSIONAL APPOINTMENT

50% Lead Laboratory Science Program, Joint Genome Institute, 2006-present

Current Responsibilities: Coordinate the solicitation and review of PI-lead sequencing proposals submitted through the DOE laboratory system; establish multiple large-genome sequencing projects (representing 15% of JGI's sequencing capacity) that address DOE missions in the area of biofuels development, carbon sequestration, and global climate change; facilitate DOE, laboratory and JGI interactions.

30% Distinguished Scientist; Environmental Sciences Division; Oak Ridge National Laboratory; 2005-present

Current Responsibilities: Coordinate the DOE effort to sequence the *Populus* genome.

Current Projects: Carbon allocation and partitioning in woody plants: a means to enhance bioenergy conversion and carbon sequestration; Genome-enabled discovery of carbon sequestration genes in poplar; Environmental influences on wood chemistry and density of *Populus* and loblolly pine; Formation of the International *Populus* Genome Consortium and creation of a *Populus* post-sequence science plan.

20% Research Professor; Departments of Entomology, Plant Pathology and Plant Sciences; University of Tennessee; 2002-present

Current Responsibilities: Coordinate the NSF research project on the *Populus* genome, advise graduate students, interact with departmental faculty and provide guest lectures and graduate seminars as needed.

Research and Senior Scientist; Environmental Sciences Division; Oak Ridge National Laboratory; 1990-2005

Previous Responsibilities: 50% in-house research, 50% contract management. In-house research: identification of genes associated with cell wall chemistry, genetic mapping in *Populus*, particularly related to carbon allocation and partitioning, and the use of genomics information to accelerate domestication of *Populus*. Contract management: negotiate annual project objectives, assure technical quality, and conduct annual project reviews for 8-12 subcontracts under an annual budget of \$1.0-1.5 million for the DOE's Biofuels Feedstock Development Program.

PRIOR EXPERIENCE

Associate Professor of Horticulture and Forestry; North Dakota State University; 1984-90
Instructor; Forest Science Department; Texas A&M University; 1981-84
Graduate Research Assistant; Forestry Department; Mississippi State University; 1979-80

Research Technician; Forestry Department; Northern Arizona University; 1978-79

OTHER PROFESSIONAL ACTIVITIES

Co-chairman of the New Phytologist workshop on Molecular Basis of Adaptation; Gatlinburg, TN, 2004
Reviewed proposals for the DOE, USDA, CPBR, NATO and NSF Competitive Grants programs; 1988-present
Reviewed manuscripts for *Silvae Genetica*, *Forest Science*, *Plant Cell*, *Organ and Tissue Culture*, *Soil Science*, *Phytopathology*, *Canadian J. Forest Research*, *HortScience*, *Tree Physiology*, *Environmental and Experimental Botany*, *Biomass and Bioenergy*, *Mathematical Biosciences*, *New Phytologist*
Served on the National Research Council's Biology Board Panel on Intellectual Property Rights; 1996
Review Panel Member, the Consortium for Plant Biotechnology Research, 1992-2000.
Panel member for the USDA/NRICGP in Plant Response to the Environment; 1993
Guest Editor for the *Canadian Journal of Forest Research*; 1992
Co-chairman of a workshop on Marker-Aided Selection; Gatlinburg, TN, 1991; Houston, TX, 1996
Reviewed proposals for NSF South Dakota EPSCOR; 1988
Reviewed 5-year project proposals for the U.S. Forest Service; 1985, 1990, 1991, 1993
Co-author of the five-year project outline for NC-99; 1985
Participated in Farm Forestry Meetings; 1984-89
Participated in the Southern Forest Tree Improvement Conference; 1979-01
Participated in the North Central Microcomputer Workshop; 1985
Participated in the North-Central Workshop on Effective Teaching; 1985
Participated in the NC-7 Biotechnology Working Group Meeting; Ames, Iowa; 1985
Participated in the North American Forest Biology Workshop; 1984-94
Participated in the International Symposium on Windbreak Technology; 1986
Participated in the International Association of Plant Tissue Culturalists; 1986
Participated in the GPAC Forestry Committee Meeting; 1986-90; Chairman GP-13, 1988-90

GRANTS

Laboratory Director's Research and Development Grant. Title: Genome-Enabled Detection of Differential Mortality in a Northern Temperate Forest Ecosystem. 2005-06. \$263,000. P.I. G.A. Tuskan.
NSF Plant Genome. The *Populus* genome: Curation and chromosomal-level assembly. 2005-06. \$1,367,000. P.I. G.A. Tuskan.
U.S. DOE OBER. Title: Genome-Enabled Discovery of Carbon Sequestration Genes in Poplar. 2002-05. \$5,137,480. P.I. G.A. Tuskan.
U.S. DOE OBER. Title: Formation of an International *Populus* Genome Consortium and Creation of a *Populus* Post-sequence Science Plan. 2002-03. \$299,000. P.I. G.A. Tuskan.
U.S. DOE Agenda 2020. Title: Environmental Influences on Wood Chemistry and Density of *Populus* and Loblolly Pine. 2001-05. \$990,000. P.I. G.A. Tuskan.
U.S. DOE Biomass Power Program. Accelerated Domestication of *Populus*. 2001-02. \$540,000. P.I. G.A. Tuskan.
Laboratory Director's Research and Development Grant. Title: Carbon allocation and partitioning in woody plants: A means to enhance bioenergy conversion and carbon sequestration. 2000-02. \$793,000. P.I. G.A. Tuskan.
U.S. DOE Biofuels Feedstock Development Program CRADA. Title: Overcoming constraints to high-yield plantation-grown hardwoods in the southeastern United States. 1996-00. \$1,316,000. P.I. G.A. Tuskan.
Laboratory Director's Research and Development Grant. Title: The isolation of DNA sequences that determine gender in Salicaceae. 1997-98. \$565,000. P.I. G.A. Tuskan.
U.S. DOE Agenda 2020. Title: Genetic control of wood properties in loblolly pine and hybrid poplar. 1996-99. \$700,000. P.I. G.A. Tuskan.
USDA Competitive Grant. Title: Mechanisms of persistence and extirpation of aspen seedlings following the

- 1988 Yellowstone fires. 1995-97. \$265,000. P.I. M.T. Turner *et al.*
- U.S. DOE Program for Ecosystem Research. Title: UV-B effects on forest tree pollen germination and genetic integrity. 1995-96. \$140,000. P.I. G.A. Tuskan
- U.S. DOE Program for Ecosystem Research. Title: Temperature Adjustment in Sugar Maple: Implications for Forest Succession in a Warmer Climate. 1993-95. \$585,000. P.I. R.J. Norby *et al.*
- Laboratory Director's Research and Development Grant. Title: Advanced Concepts for Production and Conversion of Renewable Plant Materials. 1993-95. \$600,000. Co-P.I. G.A. Tuskan and T.J. Tschaplinski.
- U.S. DOE Biofuels Feedstock Development Program CRADA. Title: Biochemical Basis of Drought Tolerance in Hybrid Poplars Grown Under Field Conditions. 1994-96. \$600,000. Co-P.I. T.J. Tschaplinski and G.A. Tuskan
- U.S. DOE Biofuels Feedstock Development Program Grant. Title: Biochemical and Molecular Basis of Water Stress Tolerance in *Populus*. 1991-93. \$325,000. Co-P.I. T.J. Tschaplinski and G.A. Tuskan.
- NSF Instrumentation and Laboratory Improvement Grant. Title: Enhancement of Undergraduate Biotechnology Cell Culture Laboratories. 1989-90. \$85,722. P.I. G.A. Tuskan.
- USDA Soil Conservation Service Grant. Title: Evaluation of cultural practices for shelterbelts in the northern Great Plains. 1989-90. \$61,960. P.I. G.A. Tuskan.
- USDA Competitive Grant. Title: Complementary *In vitro* selection of western gall rust resistant ponderosa pine. 1987-89. \$182,700. P.I. G.A. Tuskan.

PUBLICATIONS

- Yang, X.H., G.A. Tuskan and Z.M. Cheng. 2007. Divergence of the *Dof* gene families in *Populus*, *Arabidopsis* and rice suggests multiple modes of gene evolution after genome duplication. *Plant Physiology* (In press).
- Sewell, M.M., L.E. Gunter, T.J. Tschaplinski, T.M. Yin, S.D. DiFazio and G.A. Tuskan. 2007. Identification of QTLs associated with biomass production in hybrid poplar. II. Relationship among QTLs for crown architecture and stem growth. *Tree Genet. Genom.* (In review).
- Sewell, M.M., L.E. Gunter, T.J. Tschaplinski, and G.A. Tuskan. 2007. Identification of QTLs associated with biomass production in hybrid poplar. I. Heterosis and the stability of QTLs across contrasting environments. *Tree Genet. Genom.* (In review).
- Kalluri, U.C., S.P. DiFazio, and G.A. Tuskan. 2007. Genome-wide analysis of Aux/IAA and ARF gene families in *Populus trichocarpa*. Submitted.
- Heinze, B., S. DiFazio, M. Land, F. Larimer, M. Nolan, K. Ritland, D. Rokhsar and G. Tuskan. 2007. Deep Shotgun Sequencing of the Chloroplast Genome of *Populus*. *DNA Research* In prep.
- Yin, T.-M., S.P. DiFazio, L.E. Gunter, M.M. Sewell, S.S. Jawdy, S.D. Wullschleger, T.J. Tschaplinski and G.A. Tuskan. 2007. An integrated platform for comparative mapping and genome assembly in *Populus*: A perennial plant model system. In prep.
- Lin, J. L.E. Gunter, S. Harding, R.F. Kopp, R.P. McCord, C.-J. Tsai, G.A. Tuskan and L.B. Smart. 2007. Development of AFLP and RAPD markers linked to a locus associated with twisted growth in corkscrew willow (*Salix matsudana* 'Tortuosa') *Plant Biotechnology* In review.
- Quesada, T., Li, Z., Dervinis, C., Casella, G., DiFazio, S., Tuskan, G., Peter, G., Davis, J.M. and Kirst, M. 2007. Chromatin domains and the evolution of wood. In Prep.
- Davis, M., G.A. Tuskan, M.M. Payne and R. Meilan. 2006. Assessment of *Populus* wood chemistry following the introduction of a Bt toxin gene. *Tree Physiology* 26:557–564.

- Tschaplinski, 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 Physiology* 26:595–604.
- Wheeler, N., P. Payne, V. Hipkins, R. Saich, S. Kenny and G. Tuskan. 2006. Polymix breeding with paternity analysis in *Populus*: A test for differential reproductive success (DRS) among pollen donors. *Tree Genetics and Genomes* 2:53-60.
- Tuskan, G.A., S.P. DiFazio, U. Hellsten, S. Jansson, S. Rombauts, N. Putnam, L. Sterck, J. Bohlmann, J. Schein, R.R. Bhalerao, R.P. Bhalerao, D. Blaudez, W. Boerjan, A. Brun, A. Brunner, V. Busov, M. Campbell, J. Carlson, M. Chalot, J. Chapman, G. Chen, D. Cooper, P.M. Coutinho, J. Couturier, S.F. Covert, R. Cunningham, J. Davis, S. Degroeve, C. dePamphilis, J. Detter, B. Dirks, I. Dubchak, S. Duplessis, J. Ehlting, B. Ellis, K. Gendler, D. Goodstein, M. Gribskov, I. Grigoriev, A. Groover, L. Gunter, B. Hamberger, B. Heinze, Y. Helariutta, B. Henrissat, D. Holligan, N. Islam-Faridi, M. Jones-Rhoades, R. Jorgensen, C. Joshi, J. Kangasjärvi, J. Karlsson, C. Kelleher, R. Kirkpatrick, M. Kirst, A. Kohler, U. Kalluri, F. Larimer, J. Leebens-Mack, J.C. Leplé, A. Déjardin, G. Pilate, P. Locascio, S. Lucas, F. Martin, B. Montanini, C. Napoli, D.R. Nelson, C.D. Nelson, K.M. Nieminen, O. Nilsson, G. Peter, R. Philippe, A. Poliakov, S. Ralph, P. Richardson, C. Rinaldi, K. Ritland, P. Rouzé, D. Ryaboy, A. Salamov, J. Schrader, B. Segerman, F. Sterky, C. Souza, C. Tsai, P. Unneberg, K. Wall, S. Wessler, G. Yang, T. Yin, C. Douglas, G. Sandberg, Y. Van de Peer & D. Rokhsar. 2006. The genome of black cottonwood, *Populus trichocarpa* *Science* 313 (5793):1596-1604.
- Wullschleger, S.D., T.M. Yin, S.P. DiFazio, T.J. Tschaplinski, M.F. Davis, L.E. Gunter, and G.A. Tuskan. 2005. Phenotypic variation in absolute and proportional biomass allocation for two advanced-generation pedigrees of hybrid poplar (*Populus* spp.). *Can. J. For. Res.* 35:1779-1789.
- Romme, W.H., M.G. Turner, G.A. Tuskan and R.A. Reed. 2004. Establishment, persistence, and growth of aspen (*Populus tremuloides*) seedlings in Yellowstone National Park. *Ecology* 86:404-418.
- Yin, T.-M., S.P. DiFazio, L.E. Gunter, S.S. Jawdy and G.A. Tuskan. 2004. Mapping the rust resistant loci *MXC3* and *MER* in *P. trichocarpa* and assessing the intermarker linkage disequilibrium in the *MXC3* region. *New Phytologist* 164:95-106.
- Lammers, P., G.A. Tuskan, S.P. DiFazio, G.K. Podila and F. Martin. 2004. Mycorrhizal symbionts of *Populus* to be sequenced by the United States Department of Energy's Joint Genome Institute. *Mycorrhiza* 14(1):63-64.
- Tuskan, G.A., L.E. Gunter, Z.K. Yang, T.M. Yin, M.M. Sewell and S.P. DiFazio. 2004. Characterization of microsatellites revealed by genomic sequencing of *Populus trichocarpa*. *Can. J. For. Res.* 34:85-93.
- Martin F, G.A. Tuskan, S.P. DiFazio, P. Lammers, G. Newcombe, and G.K. Podila. 2004. Symbiotic sequencing for the *Populus* mesocosm. *New Phytol.* 161(2):330-335.
- Yin, T.-M., S. P. DiFazio L.E. Gunter D. Riemenschneider and G.A. Tuskan. 2004. Large-scale heterospecific segregation distortion in *Populus* revealed by a dense genetic map. *Theor. Appl. Genet.* 109(3):451-463.
- Tuskan, G.A., S.P. DiFazio and T. Teichmann. 2004. Poplar genomics is getting popular: The impact of the poplar genome project on tree research. *Plant Biology* 6:2-4.
- Slavov, G.T., G.T. Howe, I. Yakovlev, K.J. Edwards, K.V. Krutovskii, G.A. Tuskan, J.E. Carlson, S.H. Strauss and W.T. Adams. 2004. Highly variable SSR markers in Douglas-fir: Mendelian inheritance and map locations. *Theor. Appl. Genet.* 108:873-880.

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- Stirling, B., Z. Yang, L. Gunter, J. Vrebolav, G. Tuskan and T. Bradshaw. 2003. Comparative sequence analysis between orthologous regions of the *Arabidopsis* and *Populus* (poplar) genomes reveals substantial synteny and microcolinearity. *Can. J. For. Res.* 33 (11): 2245-2251.
- Gunter, L.E., G.T. Roberts, K.L. Lee, F.W. Larimer and G.A. Tuskan. 2003. The development of two flanking SCAR markers linked to a sex determination locus in *Salix viminalis* L. *J. Heredity* 94(2):185-189.
- Turner, M. G., W.H. Romme, R.A. Reed and G.A. Tuskan. 2003. Post-fire aspen seedling recruitment across the Yellowstone (USA) landscape. *Landscape Ecology* 18:127-140.
- Gunter, L.E., A.S. Black, S. Ratnayeke, G.A. Tuskan and S.D. Wullschleger. 2003. Assessment of genetic similarity among 'Alamo' switchgrass seed lots using RAPD markers. *Seed Sci. & Technol.* 31:681-689.
- Plomion, C., J. Cooke, T. Richardson, J. MacKay and G. Tuskan. 2003. Conference report on the forest trees workshop at the Plant and Animal Genome Conference. *Comp. Funct. Genom.* 4:229-238.
- Gunter, L.E., R.F. Kopp, R.P. McCord and G.A. Tuskan. 2003. Analysis of sex-linked SCAR markers in *Salix eriocephala* Michx. *Can. J. For. Res.* 33(9): 1785-1790.
- Brown, G.R., D.L. Bassoni, G.P. Gill, J.R. Fontana, N.C. Wheeler, R.A. Megraw, M.F. Davis, M.M. Sewell, G.A. Tuskan and D.B. Neale. 2003. Identification of quantitative trait loci influencing wood property traits in loblolly pine (*Pinus taeda* L.). III. QTL verification and candidate gene mapping. *Genetics* 164(4): 1537-1546.
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- Ratnayeke, S., G.A. Tuskan and M.R. Pelton. 2002. Genetic relatedness and female spatial organization in a solitary carnivore, the raccoon. *Mol. Ecol.* 11 (6): 1115-1124.
- Sewell, M.M., M.F. Davis, G.A. Tuskan, N.C. Wheeler, D.L. Bassoni and D.B. Neale. 2002. Identification of QTLs influencing wood property traits in loblolly pine. II. Chemical properties. *Theor. Appl. Genet.* 104:214-222.
- Tuskan, G.A. and M. Walsh. 2001. Short-rotation woody crop systems, atmospheric carbon dioxide and carbon management. *Forestry Chronicles* 77:259-264.
- Kopp, R.F., L.B. Smart, C.A. Maynard, J.G. Isebrands, G.A. Tuskan and L.P. Abrahamson. 2001. The status of genetic improvement of *Salix* in North America. *Forestry Chronicles* 77:287-292.

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- Dinus, R.J., P. Payne, M.M. Sewell, V.L. Chiang, and G.A. Tuskan. 2000. Genetic modification of short rotation poplar wood properties for energy and fiber production. *Critical Reviews in Plant Sciences* 20:51-69.
- Gunter, L.E., G.A. Tuskan, C.A. Gunderson and R.J. Norby. 2000. Genetic variation and spatial structure in sugar maple (*Acer saccharum* Marsh) and implications for predicted global-scale environmental change. *J. Global Climate Change Res.* 6(3):335-344.
- Davis, M., C. Elam, R. Evans, A. Wiselogel, N. Wheeler, R. Megraw, K. Jech, D. Neale, M. Sewell, R. Dinus, D. West, and G. Tuskan. 1999. Application of pyrolysis molecular beam mass spectrometry for the determination of loblolly pine and hybrid poplar cell wall composition. TAPPI Pulping Conf., TAPPI Press, Atlanta, GA. pp. 1077-1082.
- Stevens, M.T., M.G. Tuner, G.A. Tuskan, W.H. Romme, L. Gunter and D.M. Waller. 1999. Genetic variation in post-fire aspen seedlings in Yellowstone National Park. *Mol. Ecol.* 8:1769-1780.
- Tuskan, G.A., D. West, H.D. Bradshaw, D. Neale, M. Sewell, N. Wheeler, R. Megraw, K. Jech, A. Wiselogel, R. Evans, C. Elam, M. Davis, R. Dinus. 1999. Two high-throughput techniques for determining wood properties as part of a molecular genetics analysis of loblolly pine and hybrid poplar. *Applied Biochem. Biotech.* 77-79:1-11.
- Walla, J.A., C.G. Wang, C.M. Schumann and G.A. Tuskan. 1998. *Peridermium harknessii* in the north-central United States may be a complex of taxa. In: 5th IUFRO Rusts of Pines Working Group, Saariselka, Finland, Jalkanen, R. (Ed.) p. 183-191.
- Lin, D., M. Hubbes, L. Zsuffa, V. Tsarouhas, U. Gullberg, G. Howe, W. Hacket, G. Gasrdner, G. Flurnier, and G. Tuskan. 1998. Stock characterization and improvement: DNA fingerprinting and cold tolerance of *Populus* and *Salix* clones. IEA Report T12-01, University of Toronto Press, Gambles, R. and G. Page, Ed. p. 119-130.
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- 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 Phys.* 18:645-652.
- Gebre, G.M., T.J. Tschaplinski, G.A. Tuskan and D.E. Todd. 1998. Clonal and seasonal differences in leaf osmotic potential and organic solutes of two hybrid poplar clones grown under field conditions. *Tree Phys.* 18:653-658.
- Walla, J.A., G.A. Tuskan and C.G. Wang. 1997. Expression and inheritance of early inoculation responses in the ponderosa pine--western gall rust pathosystem. *Plant Disease* 81:57-63.
- Romme, W.H., M.G. Tuner, R.H. Gardner, W.W. Hargrove, G.A. Tuskan, D.G. Despain and R.A. Renkin. 1997. A rare episode of sexual reproduction in aspen following the 1988 Yellowstone fires. *Nat. Areas J* 17:17-25.
- Simel, E., L. Saidak and G.A. Tuskan. 1997. A simple and rapid method for extracting genomic DNA from non-

germinated angiosperm and gymnosperm pollen. *Biotechniques* 22:390-394.

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- Dinus, R.J. and G.A. Tuskan. 1997. Integration of molecular and classical genetics: A synergistic approach to tree improvement. In: *Micropropagation, genetic engineering and molecular biology of Populus*. Eds. N.B. Klopfenstein *et al.* Gen. Tech. Rep. RM-GTR-297:220-235.
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- Wang, Y.C., R.M. Emerick, P.D. Denchev, B.V. Conger, and G.A. Tuskan. 1995. A biolistic approach for the transient expression of a GUS reporter gene in callus cultures of hybrid poplar. *In Vitro* 31(4):226.
- Tschaplinski, T.J., G.M. Gebre, J.E. Dahl, G.T. Roberts and G.A. Tuskan. 1995. Growth and solute adjustment in calli of *Populus* clones cultured on nutrient medium containing polyethylene glycol. *Can. J. For. Res.* 25:1425-1433.
- McLetchie, D.N. and G.A. Tuskan. 1994. Gender determination in *Populus*. *Nor. J. Ag. Sci. Suppl.* 18:57-66.
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