

## Report on the 31st Southern Forest Tree Improvement Conference (SFTIC)

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**Abstract** The 31st Southern Forest Tree Improvement Conference was held 14–16 June 2011 in Biloxi, MS, USA. This marks 60 years of biennial technical conferences supported by the Southern Forest Tree Improvement Committee. The theme of the conference was tree improvement opportunities and challenges in the economy emerging around cellulosic biomass, bioproducts, and biofuels. Invited speakers from the industry, academia, and government challenged scientists and students to employ robust technologies for developing and deploying improved trees for the emerging biomass markets as well as for the existing forest products markets. Opportunities for integrating genomics into breeding and selection programs and somatic embryogenesis into deployment practices look promising for loblolly pine (*Pinus taeda*); the main industrial forest tree in the southeastern USA. Advances in enabling technologies such as DNA sequencing and genotyping open new opportunities for accelerating and achieving tree improvement in all forest tree species. Of the 109 attendees,

47 were first time conference participants and 27 were students, an encouraging sign for the future of forest genetics and tree improvement.

**Keywords** Forest genetics · Tree improvement · Genomics · Biotechnology · Cellulosic biofuels

### Introduction

The 31st Southern Forest Tree Improvement Conference (SFTIC) was preceded by the North American Quantitative Forest Genetics Workshop and the Southern Forest Tree Improvement Committee meeting. The committee voted to dedicate this conference to the memory of Professor Bruce Zobel who passed away on 5 February 2011. The proceedings will be accessible through the SFTIC Web site at <http://www.sftic.org>. The conference opened with plenary sessions where invited speakers addressed opportunities and challenges for forest trees and forest tree improvement in the emerging bioproducts/biofuels industry.

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The authors served as the organizing committee for the 31st Southern Forest Tree Improvement Conference.

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### Plenary sessions

Plenary session A—Opportunities and challenges for forest trees in the emerging biomass-based industries—speakers included Giles Ward, Mississippi State senator and chair of the Agriculture and Forestry Committee; Bill Goldner, national program leader in the Division of Sustainable Bioenergy of the Institute of Bioenergy, Climate and Environment, USDA National Institute of Food and Agriculture; Tim Rials, University of Tennessee, professor and director of the Center for Renewable Carbon; Paul Spindler, Catchlight Energy LLC, vice-president of Tech-

nology; Phil Steele, Mississippi State University, professor and leader of the Bio-oil Research Group in the Sustainable Energy Research Center; and Tim Eggeman, ZeaChem Inc., company founder and co-inventor of the ZeaChem process. The presentations discussed the potential of woody biomass industry in the southeastern USA and current projects ongoing in Mississippi, such as KiOR Inc., and elsewhere in the region. Options for converting pines and hardwoods to energy are clearly different and must be considered in planning forest operations as well as tree improvement objectives. Clearly much integration is necessary, not unlike that experienced in past tree improvement efforts where target traits varied depending on end product use, be that fiber based or solid wood.

Plenary session B—Improving forest trees for sustainable biomass-based industries—switched the emphasis from end product quantity and quality considerations in meeting bioenergy goals to genetic-based progress and programs in forest trees. Speakers included Steve McKeand, North Carolina State University, professor and director of the Cooperative Tree Improvement Program; Mike Cunningham, ArborGen Inc., product development manager; John Pait, CellFor Inc., senior vice-president of Business Development; and Jeff Dean, University of Georgia, professor of Forest Biotechnology. Significant improvements in the genetic quality of loblolly pine planting stocks were documented as well as progress in developing clonal varieties with significantly higher growth rates and potential for greater gains in a variety of silvicultural and end product traits. Clearly the integration of genomics and biotechnology, in particular mass propagation techniques such as somatic embryogenesis and mass production of specific crosses, with existing tree breeding programs has begun and is demonstrating significant gains. The plenary sessions were followed with the first of seven concurrent sessions that featured volunteered talks on technologies contributing to woody feedstock genetic evaluation and conversion to alternative fuels.

### **Careers workshop, poster session, and concurrent technical sessions**

A student-oriented workshop—“Forestry careers in the 21st century” lead by Cetin Yuceer, Mississippi State University, assistant professor of Forestry—was held on the first evening of the conference. Panel members representing the academia, business, and government provided student attendees with practical advice on obtaining employment in their organizations and fielded questions from the audience. The careers workshop was followed by a poster session that provided 28 presenters an opportunity to discuss their research with conference attendees. Concurrent sessions continued on the second day, with 30 talks volunteered in

six sessions. These sessions included pine and hardwood genetics and improvement, molecular genetics and biotechnology, disease and insect resistance, gene diversity and conservation, clonal development and production, and breeding, testing, and selection.

### **General sessions and field tour**

The conference concluded with two general sessions during the morning of the third day. These sessions highlighted Genomics and Biotechnology in Tree Improvement and Building a New Legacy in Tree Improvement, respectively. In the first session, research leaders in forest tree genomics and biotechnology Chung-Jui Tsai, University of Georgia and Amy Brunner, Virginia Tech were joined by graduate student Marcio Resende, University of Florida who filled in for his advisor Matias Kirst, and fruit tree geneticist Albert Abbott, Clemson University. The second and closing session included Tom Byram, Texas A&M University Director of the Western Gulf Forest Tree Improvement Program; Rick Meilan, Purdue University, associate professor of Molecular Tree Physiology; and Shibu Jose, University of Missouri, professor and director of the Agroforestry Center. Dr. Jose's talk provided an “outsider's” perspective on the conference as a whole. He commended the efforts of the organizing committee for the conference and the speakers for their excellent and far-reaching presentations, and encouraged SFTIC to look nationally and beyond for collaborations to strengthen forest genetics and tree improvement. Dr. Jose noted that the meeting was especially important and timely given the need for a variety of dedicated energy crops to meet the US goal for 21 billion gallons of advanced biofuels by 2022. He suggested that tree breeding assisted by genomics and biotechnology is key to meeting the yields required for an expanded number of forest species.

An optional post-conference field tour of the Southern Institute of Forest Genetics (SIFG) on the Harrison Experimental Forest followed the closing session. Field stops included E.B. Snyder's longleaf pine diallel experiment (planted in 1960), the CCLONES series 3 structured pedigree clonal test (planted in 2006), the pine species × silviculture study on section 36 (planted in 1960), and the integration of a new experiment (see Butnor et al. in these proceedings) within the existing section 36 installation. In addition, a stop at the SIFG campus with informal tours of the laboratories and other facilities was provided.

### **Participation and awards**

Among the registrants, 37 organizations were represented including 14 universities, 17 companies, and six govern-

ment agencies. The registrants came from seven countries although about 95% were from the USA. As is tradition with SFTIC, oral and poster presentation awards were given in three categories. The Squillace Award recognizing the best overall oral presentation was awarded to John Davis, University of Florida for his talk entitled “Genome-sequence enabled identification of avirulence genes in the fusiform rust fungus”, with honorable mention to Jason Hoeksema, University of Mississippi. The Zobel Award for best student oral presentation was awarded to Patricio Munoz, University of Florida (student of Dudley Huber and Gary Peter) for his talk entitled “The effect of BLUP breeding values in genomic selection accuracy” with an honorable mention to Jared Westbrook, University of Florida (student of John Davis). The Belle Baruch Foundation Award for best poster overall was awarded to Kevin Potter, North Carolina State University for his poster entitled “Range-wide assessment of genetic structure and variation in eastern hemlock, *Tsuga canadensis*, an imperiled conifer using microsatellite markers,” while second and third place poster awards were given to Jake Camp, Mississippi State University (student of Randy Rousseau) and Christine Holtz, University of Georgia (student of Scott Merkle).

### Concluding remarks

Based on conference evaluations, the 31st SFTIC was a success. Most notable were the opening plenary sessions geared towards a more general audience and the large number of first time attendees, particularly undergraduate

and graduate students. We noted the urgency of applying forest genetics principles and tree improvement practices to a wider array of forest tree species in order to meet the growing demand for wood and fiber, including biomass for bioproducts/biofuels. On the technical side, we witnessed the tremendous progress in deploying genetic gain in loblolly pine through large-scale control pollination and somatic embryogenesis propagation of high-performing full-sib families and varietal genotypes. New advances offered through lower cost DNA sequencing and genotyping were evident in applications to breeding and selection such as pedigree reconstruction (de novo or ex post facto, i.e., to correct errors) and genomic selection. Cooperative efforts to develop and deploy these technologies for applications to an array of forest tree species are now feasible and clearly needed. In conclusion, the conference provided a good sounding board for changes in our profession and promised a bright future for forest genetics and tree improvement.

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