



**May, 2010**

**New ORNL greenhouses near completion:** Three state-of-the-art greenhouses are in the final stages of construction. The greenhouses are located on the west campus, across from the Joint Institute for Biological Sciences and the BioEnergy Science Center, and represent an ORNL investment in support of plant, ecological, and microbial sciences. Recognizing the increased demands of managing now five greenhouses, a position announcement for a greenhouse technician has been posted. Duties of this position include operation of greenhouse and head-house complex; preparation of growth medium, potting, transplanting, and propagation of plant material; care and programming of automated drip-irrigation and fertigation systems; monitoring and acquisition of environmental data for greenhouse and growth chambers; and implementation of an integrated pest and disease management program.



**Students receive college degrees:** Two undergraduate students who have worked in the plant science laboratories for several years graduated from the University of Tennessee in May. Zackary Moore and Whitney McNutt both received their B.S. degree in plant sciences. Zackary focused his undergraduate studies in turfgrass management, while Whitney pursued biotechnology and horticulture with a double major in business accounting. Congratulations and best wishes to both of them!

**ORNL plant scientists develop improved approach for mapping QTL:** In a study published in the journal *Bioinformatics and Biological Insights*, Tongming Yin, Jerry Tuskan, and Stan Wullschleger cooperated with scientists at Penn State University to develop a model that incorporates heterozygosity and phase uncertainty of outcrossing species and then used that model to reanalyze a published data set on quantitative trait loci (QTL) mapping in poplar trees. Several intercross QTLs that are heterozygous in both parents were detected, which are responsible not only for biomass traits, but also for their genetic correlations. This study provides a more complete identification of QTLs responsible for economically important biomass traits in poplars.

Citation: Song Wu, Jie Yang, Youjun Huang, Yao Li, Tongming Yin, Stan D. Wullschleger, Gerald A. Tuskan, and Rongling Wu. 2010. An improved approach for mapping quantitative trait loci in a pseudo-testcross: Revisiting a poplar mapping study. *Bioinformatics and Biological Insights* 2010: 4.

<http://www.la-press.com/an-improved-approach-for-mapping-quantitative-trait-loci-in-a-pseudo-t-a1832>

**Kalluri participates in two neutron sciences proposals:** Udaya Kalluri contributed to two neutron science proposal in March. The proposals were submitted in response to a solicitation issued from the ORNL Neutron Sciences User Program.

- IPTS-2928, "In-situ SANS Structural Studies of Tension Wood Growth ". Urban, Myles, Pingali, Evans, Kalluri et al. March 2010.

- IPTS-2851, entitled "Enabling plant systems biology investigations for carbon cycling and biosequestration research." Bilheux and Kalluri. March 2010.

**Lasers used to study plant-microbe interactions:** Madhavi Martin was senior-author on a recent article published in *Applied Optics*. The article documents how laser-induced breakdown spectroscopy (LIBS) could be used to determine the impact of endophyte (*Neotyphodium* sp.) infection on elemental composition of tall fescue (*Festuca arundinacea*). Leaf material from endophyte-infected and endophyte-free tall fescue populations in field plots was examined. Leaf-tissue digestates were also tested for metals by inductively coupled plasma mass spectrometry (ICP MS). Seven metals could be reliably detected using LIBS, even though the concentrations of cadmium were below levels typically achieved using ICP MS detection. Implications of these results for research on plant-microbe interactions and plant analysis are discussed.

Citation: Madhavi Z. Martin, Authur J. Stewart, Kimberley D. Gwinn and John C. Waller. 2010. Laser-induced breakdown spectroscopy used to detect endophyte-mediated accumulation of metals by tall fescue. *Applied Optics* 49: C161-C167.

<http://www.opticsinfobase.org/ao/abstract.cfm?URI=ao-49-13-C161>

**Students involved in all phases of ORNL plant science research:** The Plant Systems Biology group provides a good opportunity to involve students in research projects across a broad spectrum of biochemistry, physiology, genetics, and genomics; and in areas from basic biology to bioenergy to climate change. Currently our research benefits from involvement of the following post-docs, post-MS, and interns:

Post-doctoral Research Associates: Priya Ranjan (Michigan Tech); Lin Zhang (Wayne State University); Poornima Sukumar (Wake Forest University); and Abhijit Karve (Clemson University).

Post-Masters: Kalyani Telu (University of Delaware); and Chuyu Ye (Beijing Forestry University).

Interns: Sara Allen (University of Tennessee); Alyssa DeLeon (State University of New York, Syracuse); Anjali Bisaria (Princeton University); Jani Radhakrishnan (University of North Carolina); Rhonda Egidy (Pittsburg State University); Whitney McNutt (University of Tennessee); Alex Meyers (Tennessee Tech University); and Zack Moore (University of Tennessee).

**Wullschleger explores ecosystem warming in the Arctic:** Stan Wullschleger has received funding from the Department of Energy's Biological and Environmental Research program to evaluate a soil warming prototype at two sites in Alaska. The Arctic is especially important to the topic of global warming because of the large land area they occupy and the layer of permanently frozen soil, known as permafrost, which has the potential to release large amounts of greenhouse gases like carbon dioxide and methane through plant and microbial-mediated processes. Stan and others involved in this project will use an array of specially-designed vertical heaters below ground and forced-air heaters above ground to warm an area of land about 20 meters in diameter. Prototypes will be tested in 2010 and 2011 at a boreal forest site northeast of Fairbanks and at a tundra site on the Barrow Environmental Observatory, Barrow, Alaska. Partners in this activity include the U.S. Army Cold Regions Research and Engineering laboratory (CRREL) and the Barrow Arctic Science Consortium (BASC).



**Kalluri attends conference on biofuels:** Udaya Kalluri gave a presentation on “Molecular factors associated with altered cell wall chemistry in Populus” at the 32nd Symposium on Biotechnology for Fuels and Chemicals, Developments in New/Improved Biomass Sources session, held at the Hilton Clearwater Beach, Clearwater, FL April 19 - 22, 2010.