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Plant Sciences Newsletter

Plant Sciences

Winter 2009

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Department of Plant Sciences

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Plant Sciences Newsletter

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Green T Impact



By Curtis Stewart

Curtis Stewart is an associate professor in Plant Sciences and a Registered Landscape Architect. Additionally, he teaches for the College of Architecture in the landscape architecture graduate program. Areas of teaching include landscape construction, site analysis and site design.



It is 561 miles from East Lansing, Michigan to Knoxville, Tennessee. It is a long and sometimes boring drive. But on that drive during the spring of 2007, the Green T Student Landscape Organization was conceived. Traveling back from the annual PLANET (formerly ALCA) Student Career Days annual competition at Michigan State University, a group of six Plant Sciences undergraduates discussed the long-standing UT Horticulture Club and how to make it more relevant in today's world. Today's UT student is different than those of the past. These six students wanted to make more of an impact, not only in their lives but on the UT campus and the community as a whole.

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Alumni Giving Supports Life-Changing Experiences Abroad

by Mark Clark

The opportunity to study abroad is often a life-changing experience. Tasting the foods and seeing the monuments, galleries, gardens, art and culture of another country is entertaining, educational and frequently very inspiring. Thanks to Garry Menendez, associate professor of Landscape Design, 15 students were able to experience the glorious gardens of Italy in the summer of 2009.

The course featured a 17-day tour of the finest gardens and landscapes in Italy, including those in Rome, Florence, Tuscany, the Mediterranean Coast, Lakes Maggiore and Como, and breathtaking Venice. Students described the experience as “absolutely amazing” and “unlike any other experience” they’d ever had. This experience enriched their lives, provided an intense educational environment and allowed students and faculty to interact in very beneficial ways.

Menendez believes the experience is invaluable and stated, “Students learn more – about themselves, the world, its history, landscape, and culture – in this intense and compact course than they could ever learn sitting in a classroom.” Books and drawing tables provide theories and opportunities to improve technique, but it’s the experience that helps stimulate a passion for learning. Anyone who has traveled abroad can likely relate to Menendez’s belief.

Many students express interest in studying abroad but have trouble coming up with the money to do so. The investment is approximately \$5,000 for each student to participate. This money covers tuition, travel, dining, lodging and admission to select gardens and meaningful historical sites. Occasionally, there is limited support available from the Programs Abroad Office, but support from alumni and donors is critical to making this opportunity more attainable to our students.

Mark Clark is a UT alumnus from Millington, TN and has seven years of experience working in Alumni Affairs and Development. He primarily works with three academic departments, including Plant Sciences. Additionally, he provides support to the College of Agricultural Sciences and Natural Sciences, assists with Ag Day, the Fall Scholarship Banquet, the Spring Awards Banquet and the UT Gardens. He can be reached at mclark4@utk.edu or 865-974-5315.

“It’s such a great experience for the students. Right now, the trip is limited to those who can afford to go. My dream is to have an endowment that would make this opportunity more affordable so all of our students could consider it,” said Menendez. Plans are already in place to take another group of students to picturesque England and Ireland this summer.

If you would like more information about this program or how you can support it, please contact Garry Menendez at menendez@utk.edu or Mark Clark at mclark4@utk.edu. ✿



Tobacco Programs in Plant Sciences – Adjusting to Changing Times

By Paul Denton



Tobacco has been an important crop for Tennessee farmers since the early days of European settlement. Through the 1990s, it ranked as one of the top three crops in cash receipts by Tennessee farms. In the past decade, its importance has declined for a variety of reasons, but in 2008 it still ranked sixth among Tennessee crops in value of production, with a value of \$110 million. At the same time, the number of growers in the state has declined, from more than 14,000 in the mid-1990s to an estimated 1,500 to 2,000 today. The farms have grown larger, with the average acreage per farm roughly tripling, and the production has become concentrated in about 20 counties in north central and northeastern Tennessee.

Tobacco research and Extension programs in the Plant Sciences Department and in UTIA in general have changed to meet the new situation. The most notable change is the overall integration of UTIA tobacco programs with the University of Kentucky. As acreage declined in both states, it became obvious that resources needed to be combined to continue to offer the highest-quality programs. All three of the Plant Sciences faculty members with major tobacco responsibilities now have joint programs in Tennessee and Kentucky. Bob Miller, located at the Greeneville Research and Education Center, leads tobacco breeding effort in both states. Andy Bailey, located at the University of Kentucky Research and Education Center at Princeton, Kentucky, leads the dark tobacco production research and Extension program for both states. Paul Denton, located in the Plant Sciences Department at Knoxville, leads

the burley tobacco Extension program in Tennessee and works jointly with Bob Pearce at the University of Kentucky in conducting burley tobacco Extension programs in Kentucky. Miller and Bailey have majority UK appointments, while Denton's appointment is primarily UT, but as a practical matter all are available to assist producers in both states.

Field research in tobacco production and variety development has been consolidated over the past few years at the Highland Rim Research and Education Center in Springfield and at the Greeneville Research and Education Center. Among the various research



Dr. Paul Denton joined the faculty of Plant Sciences in 2003. His research interests include conservation tillage, soil fertility and best practices in tobacco production.



projects, Miller's work in variety development stands out. Over the course of his career, Miller has developed and released a series of high-quality, high-yielding burley tobacco varieties combining enhanced resistance to black shank with resistance to viral diseases, black root rot and fusarium wilt. These varieties, in order of release, are TN 86, TN 90, TN 97, KT 200, KT 204, KT 206, KT 209 and KT 210. Collectively, they are currently grown on more than two-thirds of the burley acreage in the United States, and are also commonly grown internationally. Other research efforts include nitrogen fertilization, growing and curing practices that reduce selected carcinogens, mechanization of harvest and market preparation, and proper use of crop protection agents.

The tobacco research and education effort at UTIA and in Plant Sciences is not as large as in the past, but through partnerships with other states and efficient targeting of resources, the needs of Tennessee tobacco producers for enhanced production technology are still being met. ❁

Protected Agriculture Research and Outreach in Tennessee



by Carl Sams



Grafted greenhouse tomatoes grown in perlite.

The Protected Agriculture Program at UT focuses on providing practical and reliable information to the growers, researchers and governing bodies of the state of Tennessee. In an effort to assist growers, the UT Protected Agriculture Program works toward developing and supporting a strong, sustainable and profitable fruit and vegetable sector in greenhouses, high tunnels and other structures through research and dissemination of information.

The term “Protected Agriculture” refers to any structure or system that modifies the natural environment to achieve optimal plant growth. These modifications can range from utilizing a simple row cover to constructing a complex, computer-controlled greenhouse, and can encompass techniques from hydroponics to organics. Protected agriculture increases crop yields, extends the growing season and lends itself to easier production of high-value crops by reducing the economic risk through careful control of the environment.

The Protected Agriculture Program serves to advance greenhouse production systems in Tennessee to address the needs of agricultural producers in the region who own small to medium-sized farms and who are seeking to produce alternative, high-value crops. The majority of farms in this region are too small to be economically sustainable using only row crop production, so tobacco and row crop growers have been looking for new ways to supplement their farm income. Protected agriculture production is a viable option, since many growers have structures already in place that are used for tobacco seedlings; so an alternative, high-value crop can be economically produced in the off-season of their existing operation.

Dr. Carl Sams is a professor in the Department of Plant Sciences. His research interests include: fruit and vegetable crop physiology, effects of abiotic stress on disease resistance, yield and quality of fruit and vegetable crops, and plant mineral nutrition.

In the past 10 years, there has been a significant increase in the importation of greenhouse-grown, high-value and nutritionally significant vegetable crops into the United States from Canada, Mexico and Europe. These crops can be grown in this region and, given the proper infrastructure improvements, can increase the economic stability of small farms.

Benefits of greenhouse production systems include reduced reliance on soil fumigation and use of methyl bromide; reduced pesticide usage, since weeds are eliminated as a problem and bio-control is more effective in the controlled environment; improved yields due to the control of light, temperature, humidity, irrigation and fertility; and increased profit by harvesting during the time of year when market prices are at their highest.

Existing structures on farms may be adapted to production of greenhouse vegetables, medicinal plants or alternative new crops with high value for the grower. Ongoing studies at the Plateau Research and Education Center include variety trials, spacing trials, pruning and trellising trials, and grafting trials of greenhouse and heirloom tomato varieties. These studies will provide growing guidelines for maximizing yield and nutritional quality to meet consumer demands, while minimizing costs to the grower. At the UT campus greenhouses, we have studies involving

the following: strawberries, blackberries and raspberries; Galia melon variety trials; tomatoes grafted for disease control and yield increase of heirloom varieties; an evaluation study of banker plants for biological pest control; and studies of cultural strategies to enhance nutritionally important carotenoid (e.g., lycopene) phytochemicals in vegetable crops.

As a result of these research and outreach efforts, Tennessee growers will have increased opportunities for expanding their production and obtaining additional income through local markets in the off-season.

Studies at the ETREC in Knoxville continue to evaluate effects of propagation on greenhouse strawberry production and to identify cultivars for fall and winter production. Research is also being conducted to evaluate the use of predators and parasitoids for biological control of greenhouse pests. Finally, trials have been initiated to evaluate greenhouse production of raspberry and thornless blackberry. 🌱



Green T is a student organization that provides professional, social and educational activities for students in the green industry and other disciplines. The club participates in competitions, community service projects and campus improvements, and has a role in the development of future leaders in the workforce. With that as their platform, the group set these four goals for the organization:

1. To help our members gain a competitive advantage in the green industry.
2. To be known throughout the University of Tennessee in a positive manner.
3. To obtain an alumni following and a great industry relationship.
4. To complete community service projects that help out the university, our community and the less fortunate.

In the last two years, the group has certainly lived up to its goals. Several of our students have captured very lucrative jobs across the country with nationally recognized firms. Others have set their personal goals high and have entered the local and regional market in positions they had not thought possible. The Green T has also already earned a reputation across campus as an active and aware group, willing to step in and contribute wherever needed.

As a result of the group's efforts, many lost alumni have been reintroduced to the organization and the changes to Plant Sciences and CASNR. As a result, we have seen personal and professional contributions increase as our past graduates become more interested in our students. But the most impressive contribution by the Green T has been its community service. The Web site <http://web.utk.edu/~greent/> showcases some of the group's activities.

Two of the most impressive projects involve serving an individual and an entire group. After Tonya Herrera's husband was killed in action in Iraq, she was left with the task of creating a home for her daughters. Green T stepped in and designed and installed the landscape for her home. This effort is summed up in the words of one of the students: "It's a small token of our appreciation. It's nothing compared to what her husband did."

At the UT hospital, administration and staff stressed the need for a healing garden to assist in the physical and emotional rehabilitation for patients and families. Designed by a local landscape architect, the plan provides wonderful spaces of color, texture, sound and restive alcoves. In a single day, the Green T members cleaned out and then installed this delightful and much needed amenity for hundreds of people for years to come. This video link will let you share in this special place: <http://www.youtube.com/watch?v=UzT6CFbXTZg> Many people have found their way through the landscape and horticulture programs at UT. And regardless of the year, the degree or the name of the club, we all share in the bond of being UT graduates. But more than that, we have passed down a legacy of environmental stewardship and community service. In a very short time, the Green T members have shown that they have embraced that legacy and are taking it to even greater levels. As a tangible result of their contributions, this campus and this community are richer for it. Visit the Green T Web site and see for yourself the positive impacts these young people are having. 🌱

Top Left: Undergraduate greenhouse workers Ashley Swafford and Jon Mixon.
Bottom Left: Plant Sciences research greenhouse.



Preparing University of Tennessee Students for Careers in the Green Industry

by Dick Ott

Preparing students at the University of Tennessee for careers in the green industry is both a challenge and a privilege.

A challenge since each student is an individual, each with a different major than the next. Who has industry experience? Who's proficient in their major, and who's not? Who needs the most help? What changes do I need to make to the course for them?

It is a privilege to teach them, since I am not an academican, but a lifelong green industry person with a sincere passion for preparing the next generation of students to serve residential, commercial and public horticulture venues. I have one foot in academia, and two feet in the green industry,

Once a year, primarily graduating seniors attend my Professional Practices class, all eager to learn, eager to graduate and apprehensive, rightfully so, about the future. Their majors are from both horticulture and turf, all with varying degrees of technical and professional proficiency.

After several years of teaching Professional Practices, I've found most students seem to be well-rounded technically, in their major, while many are challenged with their writing skills, presentation skills and business basics – profit and loss statements, balance sheets, organizational charts and management skills.

Most students seem to have sufficient skills for the entry-level positions, but need help in preparing to take the next career step via a promotion.

As the Professional Practices class has evolved, I have shifted my emphasis to improving their communication skills, both verbally and in writing, and focusing on people skills – interviewing, managing and leading. Solutions include listening to six to eight industry guest speakers each semester from small, medium and large firms; individual coaching; suggesting Toastmaster, Dale Carnegie or Clarence Brown experiences; sharing successes and failures from my career; and case studies, as well as having all the students conduct individual research on selected subjects in their major.

We also look at the latest technological advancements in their fields.

A final area we focus on is establishing trust, another key critical element to be a successful professional. Be on time. Look like a professional. Speak well. Be prepared. Write well. Use a “wow

Dick Ott is currently the director of the National Interiorscape network (www.interiorscapenetwork.com) which serves the needs of over 100 interiorscapers in North America and England. Additionally, he has been an adjunct professor in the department of Plant Sciences for the last 11 years teaching interior landscaping as well as professional practices to graduating seniors.

factor” in all presentations. Be honest. Always under-promise and over-deliver. Use critical thinking. Be a professional. All of the above help to build trust in the individual, the company and the company's product or service.

Would you like to contribute to helping our graduating seniors be more prepared for their first job after graduation? If you are interested in being a guest speaker, or you have specific forms, brochures or advice you would like to share, please contact me at dott@interiorscapenetwork.com. ❁



Left: Lupines on display. Right: Example of plant material used by our graduating seniors.

A Note from the Department Head

by Bob Augé



We chose the name Plant Sciences for our department in 2002 because it is simple and speaks to the broad spectrum of work we do in plant agriculture, biology and environmental sciences.

A more descriptive – but a bit unwieldy – name for our department would be Applied & Fundamental Plant Sciences, Arts & Technology, Horticulture & Agronomy, Turf & Landscape Design.

One way to get a sense of who we are is to view even a very partial list of the plants we investigate and educate people about in any given year: cotton, poplar, tomato, grapes, herbs, switchgrass, pumpkins, soybean, diesel tree, dieffenbachia, corn, alfalfa, sorghum, peaches, apples, ornamental grasses, tobacco, broccoli, palmer amaranth...

Dozens of turfgrass genera, species and varieties. Hundreds of agronomic row-crop varieties. Hundreds of ornamental annual and perennial flowers. Hundreds of modern and heirloom vegetables. Hundreds of native herbaceous and woody plants. Hundreds of weedy and invasive species.

Assembling this breadth of expertise into one department has many pay-offs in terms of novel and productive approaches to teaching, research and outreach.

It's fun to witness interactions at seminars, faculty meetings and student discussions:

- A turfgrass stress physiologist connecting with a landscape architect to scheme about environmentally friendly golf course design,
- A landscape architect and agronomic weed scientist discussing approaches for controlling unwanted plants that have volunteered onto our storage shed's new green roof,

- A weed scientist partnering with a vegetable horticulturist to discover that low doses of a particular herbicide increase health-promoting substances for humans,
- A vegetable horticulturist teaming up with a bean breeder to develop an exceptionally good-tasting edamame for the U.S. market,
- A rice functional genomicist and horticultural entomologist planning an investigation of volatile compounds arising from dogwood leaves that may attract predators of dogwood insect pests,
- A monocot genetics expert teaming with a public horticulturist on a planting of biofuel plants in the UT Gardens,
- A plant geneticist strategizing with an ornamental horticulturist about how to encourage root symbioses to help increase the ability of a fern to pull toxic heavy metals from soil.

This is just a small glimpse. As one who reviews the many exciting accomplishments of our faculty, staff and students, I see many dozens of such examples every year. And we have as many unique and productive partnerships beyond the department as within: with industry, government agencies, other departments at UT and many other universities throughout the country and the world.

This diversity of knowledge across plant-minded scientists and educators has helped in building strong, interdisciplinary investigative, academic and outreach programs.

Within this large and diverse department, we do have clear common denominators. The two themes that run through and unite all of our effort are improvement and security of crop production, and landscape stewardship. Like horticulture and agronomy departments across the USA, economic and environmental sustainability are key focuses for our programs. *

Bob M. Augé

Dr. Bob Augé is department head for Plant Sciences, serving as an advocate for all areas of teaching, research and outreach in the department. His past research has included plant environmental physiology, mycorrhizal symbiosis and tree response to climate change. Past teaching responsibilities included plant physiology, internet technology and scientific writing.



Photo of Okra in flower with Winterberry Holly by Andy Pulte.

UT's Public Horticulture Program Is Blooming With Opportunities!



by Andy Pulte

Andy Pulte teaches, advises and coordinates the undergraduate program in the Department of Plant Sciences. Additionally, he works with the UT Gardens as the manager of their greenhouse facilities.

Those who enjoy gardening know there is more to plants than their obvious environmental benefits. Plants can improve our everyday lives in powerful ways. UT's Plant Sciences Department is on the cutting edge of exploring people-plant relationships in our public horticulture program. This area of focused study is available for both undergraduate and graduate students.

What is public horticulture? Public horticulture is a growing area of horticulture that places an emphasis on people, their education, interactions and enjoyment of plants. Oftentimes, the easiest way to explain it is by saying "anywhere people and plants meet." Many of our students go on to work in exciting careers facilitating the environments where the public enjoys plants. Additionally, they can work in careers that enhance human well-being through education and therapy. This can often include careers in public gardens. Public gardens are truly an important facet of American society, providing an outlet for leisure activity, environmental education and conservation of plant species.

What are students saying?

Ariel Tester, Bristol, Tennessee

Why did you choose UT and specifically a program in public horticulture?

I became interested in the intriguing world of plants as a biology student at Carson-Newman College. To further pursue my passion, I transferred to the specialized program of public horticulture at the University of Tennessee. My challenging and focused major lets me share my love of plants with others in a way that is both rewarding and useful.

What career path would you like to take after graduation?

I hope to enter the field of horticulture therapy. In this career path, gardening is used as a therapeutic benefit for many different types of illness or injury.

Joe Cope, Charleston, South Carolina

What was your background before coming to UT?

I received my associate's degree in horticulture at Trident Technical College in Charleston, S.C. I worked in the industry for a few years before moving to Boston to take an internship and then an apprenticeship at the Arnold Arboretum. This experience really spurred my interest in public horticulture.

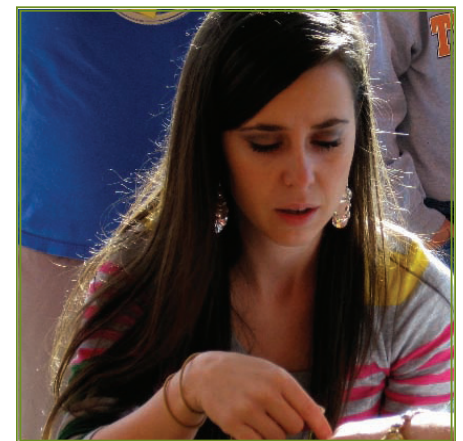
Why did you choose UT's public horticulture program over your other choices?

I decided on UTK for a number of reasons. First, I was looking for a school that had a dedicated public horticulture program, which narrowed down

my choices. Next, I looked into the programs and courses themselves and was really impressed by UTK. I was able to visit in the spring and was impressed with the facilities, faculty and especially the UT Gardens. 🌱



Joe Cope



Ariel Tester

Alumni Update

Andrew M. Scabbo

I was one of the last students to receive an undergraduate degree (BS) at the University of Tennessee in the Plant and Soil Science Department, which is now reorganized into two departments – Plant Sciences and Biosystems Engineering and Soil Science.

As an undergraduate, I worked with the staff, faculty and students on the UT agricultural campus and received an exciting education in the agricultural sciences. My undergraduate courses in plant, soil and environmental sciences prepared me to pursue a master's degree in soybean breeding in the Plant Sciences Department under the supervision of Dr. Vince Pantalone.

Dr. Pantalone, along with many other professors from the department, enabled me to accomplish my graduate research goals by teaching me scientific theory and methods and always encouraging me to strive for excellence in both educational and professional settings.

The foundation of my higher education and professional aspirations was built in the Plant Sciences Department by the professors, students, teachers, researchers and Extension specialists. They gave me the skills and knowledge necessary to continue my education in plant sciences, specifically soybean breeding, as I am now currently a Ph.D. candidate at the University of Arkansas, and will be graduating in December of 2009.



Andrew M. Scabbo



Craig S. Charron

Craig S. Charron

Craig S. Charron is a research plant physiologist in the Beltsville Human Nutrition Research Center (BHNRC) of the U.S. Department of Agriculture. He conducts controlled dietary interventions in humans to explore the health benefits of nutrients, particularly the bioavailability of phytonutrients and their potential for reducing cancer risk, oxidative stress and inflammation.

Prior to joining BHNRC, Charron developed expertise in analytical chemistry (HPLC-MS/MS and GC-MS) of plant compounds. In conjunction with human feeding studies, Charron applies this experience to characterize phytonutrients such as anthocyanins, isothiocyanates, isoflavones and glucosinolates.

To gain insights into nutrient metabolism, Charron has worked with colleagues to develop a system for stable isotope labeling of plant-derived nutrients for use in bioavailability studies.

Comments:

I was honored to be asked to write a few words about how my experiences in the Plant Sciences Department prepared me for my current career. I was a research associate from 1995 to 2005, working in the lab of Carl Sams. During this time, I earned a Ph.D. while studying the effects of environmental influences on glucosinolate content in Brassicas. The people of the UT Plant Sciences Department were very supportive of my professional development. I was encouraged to pursue my research interests and was given broad access to laboratory resources, greenhouse space and field plots. The variety of experiences and challenges I faced made my transition to my current position an easy one. As important as technical skills are, the greater benefit of a good education is to learn how to adapt to and thrive in new circumstances. I now conduct human nutrition research, and have relied a great deal on the problem-solving strategies I developed in Knoxville. I fully appreciate the opportunities I was given in the Plant Sciences Department to extend my experience and expertise as a scientist. ✿

Alumni Q&A

Thinking back, why did you choose the University of Tennessee?

I wanted to stay in the Southeast for college. UT has a highly respected and diverse horticulture program with strong ties to the industry in the state.

How have you stayed connected with UT?

I have maintained connections with some faculty members, but many of my professors I had have since retired or moved. However, I do visit Knoxville regularly in the fall while attending football games.

Do you remember a person who inspired you while at UT?

Dr. Don Williams was my greatest inspiration while a student at UT. Don Shadow, owner of Shadow Nursery in Winchester, Tennessee and a UT alum, who I worked for during one summer, had a tremendous impact on my life and career.

Tell us a little about what you have been up to since graduation.

For starters, a lot of school. I went to Edinburgh, Scotland for a master of science in plant taxonomy that was run jointly by the University of Edinburgh and the Royal Botanic Garden Edinburgh. Upon returning to the U.S., I was hired as a curatorial associate at the Arnold Arboretum of Harvard University in Boston. I left Boston and returned to the Southeast to pursue a Ph.D. at North Carolina State University in Raleigh.

Following graduation, I was hired as the associate director of the North Carolina Botanical Garden at the Uni-

versity of North Carolina, Chapel Hill. After three years in that position, I was interested in relocating to a different part of the country and wanted to land a job that involved less administrative duties and more hands-on time with plants. I ultimately landed in Chicago, working as a curator at the Chicago Botanic Garden. I am also an adjunct faculty member at the Illinois Institute of Technology in Chicago, teaching a plant materials course in the Master of Landscape Architecture program. I am currently the co-chair of the Research and Strategy Working Group for the city of Chicago's Urban Forest Agenda, advising city agencies on best management practices for protecting and expanding the urban forest.

What would your advice be to current students in Plant Sciences?

Have fun! These will be some of the best years of your life, but go to class, study and make as many connections as possible. You WILL use and need that information as well as the contacts you make along the way. ✿



Name: Andrew Bell

Home Town: Kingsport, Tennessee

Current City: Chicago, Illinois

Employer: Chicago Botanic Garden (and Illinois Institute of Technology, College of Architecture)

Title/Occupation: Curator (and Adjunct Associate Professor, Master of Landscape Architecture program)

UT info: B.S. Ornamental Horticulture and Landscape Design, Botany minor, 1995.

Other school info:

M.S. Plant Taxonomy, University of Edinburgh (Scotland, UK) 1996.

Ph.D. Horticultural Science and Plant Pathology, North Carolina State University (Raleigh) 2004





Turf Research in Tennessee

By Jim Brosnan



Turfgrass research at UT is thriving! The team here in Knoxville has established itself as one of the top turfgrass research groups in the southeastern United States, if not the nation.

The turfgrass weed science research program is in full swing. We are evaluating the efficacy of many commercially available and experimental chemistries for the control of broadleaf and grassy weeds in various cool- and warm-season turfgrasses. One of our current drives is to explore the effects that various cultural and environmental factors have on herbicide performance. Recently, we finished a project (in collaboration with Drs. Armel and Mueller) that determined annual bluegrass control could be achieved with a new sulfonyleurea herbicide at a 75 percent lower application rate when the treatment was applied in coordination with nitrogen fertilizer. Radio-labeled studies in the lab confirmed that the fertilizer treatment increased herbicide translocation, leading to improved performance in the field. We plan to continue this work with other chemistries this winter.

Matt Elmore joined the turfgrass weed science team in June of 2009 as an MS student. Since his arrival, Matt recently finished a project investigating the effects of various growth-regulating compounds on the overall plant health of two creeping bentgrasses maintained under drought stress. Currently, Matt is working on a project investigating differences in the physiological response of hybrid and common bermudagrass to three carotenoid-inhibiting herbicides. In the spring of 2010, Matt will use growing degree-day modeling

to investigate the effects of application timing on the efficacy of three carotenoid-inhibiting herbicides for the control of dallisgrass.

Dr. Brandon Horvath joined the UT turf research team in May of 2009 and has his turfgrass pathology research program up and running. Current projects are evaluating programs for the control of dollar spot (*Sclerotinia homoeocarpa*) on creeping bentgrass putting greens, as well as the control of brown patch (*Rhizoctonia solani*) in residential turf settings with both sprayable and granular fungicides. Brandon and I have begun studies investigating the effects of crop protectants on the overall health of turfgrasses subjected to various environmental stresses. Brandon is actively recruiting graduate students and expects to have one onboard by January of 2010.

Dr. John Sorochan's research program continues to investigate strategies for maintaining turfgrass on heavily used athletic fields. Will Hasselbauer, a graduate student working under John's direction, is in his second year of research exploring the best practices for plant growth regulator applications on athletic field turf. In an effort to serve stakeholders in West Tennessee, John has taken the lead on researching best-management practices for ultradwarf bermudagrass putting greens. His graduate student, John Kauffman, is currently exploring the cold tolerance of multiple ultradwarf varieties, as well as the effects of various vertical mowing, rolling and growth regulator applications on their performance. New ultradwarf plots were installed at the West Tennessee Research

and Education Center (WTREC) this summer with the drive of continuing this research at that facility. John, Adam Thoms (a graduate student working with John) and I have also been collaborating on research exploring management strategies for zoysiagrass fairways in Tennessee. Studies have looked at various mowing regimes, as well as the effects of plant growth regulator applications on divot incidence and recovery. Lucas Freshour began his MS program under John's direction in the spring of this year. He will be working on the relative fitness of *Poa* species in the transition zone.

In July, the UT turfgrass team made a major announcement. AstroTurf Inc. donated the construction of a \$1.5 million Center for Safer Athletic Fields at the East Tennessee Research and Education Center (ETREC) here in Knoxville. This facility will be composed of 60 (450 ft²) plots, each equipped with a lysimeter. Bermudagrass and Kentucky bluegrass turfs will be established, on five different rootzones, alongside several synthetic turf surfaces commonly used on athletic fields. This center will revolutionize turfgrass research efforts at ETREC; the facility will be used not only to compare the performance of synthetic and natural turfgrass surfaces maintained under sports field conditions, but also for studies investigating the effects of various facets of the turfgrass management enterprise on the carbon sequestration capabilities of warm- and cool-season turfgrasses. Furthermore, we have plans to study the leaching potential of various crop protectants applied to turfgrasses grown on different rootzones. Construction of the center should begin this fall. ❁

Faculty Focus: Weed Science Team



Dr. Greg Armel, Assistant Professor

Dr. Armel is a native of Virginia, and he earned his B.S. in forestry wildlife management, M.S. in ag education and Ph.D. in weed science from Virginia Tech University. Armel worked under the direction of Dr. Henry Wilson, one of the most respected weed scientists in the nation. After graduation in 2002, he worked for DuPont ag chemical company in their herbicide discovery group, most recently as an herbicide development specialist.

Armel's area of responsibility at UT is weed control in horticultural crops, including vegetables, lawn turf and also invasive plants in natural areas. His appointment is 75 percent Extension and 25 percent research. He has undertaken several Extension initiatives since joining the department, including a database of trade names of herbicides and a major project on weed identification. Armel is a talented and gifted plant physiologist whose expertise is often sought out on a wide variety of plant projects.



Dr. James T. Brosnan, Assistant Professor

Dr. Brosnan received a Ph.D. in agronomy (turfgrass) from Penn State University; an M.S. in plant, soil and insect sciences (turfgrass) from the University of Massachusetts-Amherst; and a B.S. in turfgrass science from Penn State University. Before coming to Tennessee in August 2008, Brosnan was on the faculty of the University of Hawaii at Manoa, Honolulu. He was an assistant specialist of turfgrass management, a 12-month appointment with 55 percent Extension, 35 percent research and 10 percent teaching responsibilities.

Presently, Brosnan leads the turfgrass weed science research and Extension program. His research focuses on effective and economical strategies for broadleaf and grassy weed control in turfgrass systems, including golf courses, athletic fields and residential landscapes. He is also studying the effects of plant growth regulators on both warm- and cool-season turfgrasses. Brosnan has developed the Web site www.tennesseeturfgrassweeds.org.



Dr. Thomas C. Mueller, Professor

Dr. Mueller received his B.S. in 1983 from the University of Illinois, his M.S. in 1987 from the University of Kentucky and his Ph.D. in 1990 from the University of Georgia. He grew up on a small grain farm in rural Illinois, where his family farm produced corn, soybeans and wheat. Through several experiences in the private sector, he came to understand the pragmatic aspects of agronomic production systems. He joined the University of Tennessee in April 1991 as an assistant professor, was promoted to associate professor in 1996 and to professor in 2003.

His research focuses on the agronomic control of major weeds in corn, soybeans and wheat; and the environmental fate of herbicides in soil and water. He teaches classes on weed science and agronomic crops.



Dr. G. Neil Rhodes Jr., Professor

Dr. Rhodes, a native of Blount County, Tennessee, received his B.S. and M.S. from the University of Tennessee in 1977 and 1979, respectively, and his Ph.D. in 1982 from North Carolina State University. Prior to joining the faculty of the Department of Plant and Soil Sciences in 1985, he worked as a field research and development representative in the private sector in Mississippi. During the 1980s through 2000, Rhodes worked in each aspect of the land-grant mission – Extension, research and teaching.

Rhodes served as department head of the Department of Plant Sciences from 2002 to 2008. He first served as interim head of the Department of Plant Sciences and Landscape Systems formed in 2001 with the merger of Ornamental Horticulture and Landscape Design and the plant scientists of Plant and Soil Sciences.

On April 1, 2008, Rhodes returned to his 100 percent Extension weed science specialist position, where he excelled for many years before becoming department head. His focus area is weed control in forages, biofuels, tobacco and aquatics

Dr. Lawrence E. Steckel, Associate Professor

Dr. Steckel received his B.S. in 1987 from Western Illinois University, an M.S. in 1989 from the University of Missouri and a Ph.D. in 2003 from the University of Illinois. He was employed as a seed corn company agronomist in the private sector for 10 years. Through his experiences as an agronomist, he enjoyed working with farmers and helping them solve management challenges. His study emphasis while at Illinois was researching the biology, ecology and management of a very troublesome pigweed species, common waterhemp.

Steckel has a 75 percent Extension and 25 percent research appointment at the University of Tennessee. He has statewide Extension responsibility as a weed specialist for all row crops. His research program is focused upon the study of the biology and management of weeds that are troublesome to Tennessee row crop producers. His most recent Extension information can be found at www.utcrops.com, or in the widely circulated Weed Control Manual for Tennessee (PB 1580), which is available at www.weeds.utk.edu.



Undergraduate Concentrations



In the Landscape Design & Construction concentration, our focus is on all of the elements that create the landscape – balancing the concerns of people and environment in designing landscapes, installing plantings and stewarding these creations. Ours are “green” endeavors, melding art, science and business into creative acts of beautifying our surroundings.

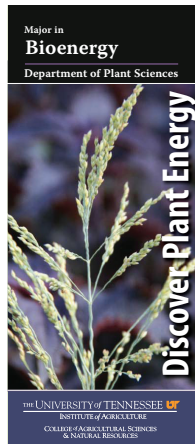


Public horticulturists write gardening books and articles, host gardening shows, and coordinate educational programs at botanical gardens or Master Gardener programs. Public horticulturists also manage public gardens, parks and greenways, and ensure that our nation is conserving plants through managed plant collections and plant exploration research all over the world.

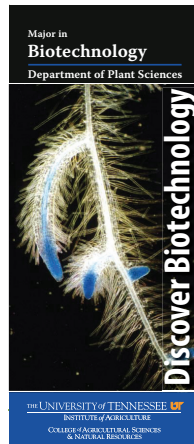


Turfgrass managers are involved with the production and maintenance of grasses for recreational, aesthetic and environmental uses. Students interested in careers in golf courses, athletic field and commercial turf management have the opportunity to develop a personalized program by selecting classes offered in a wide variety of areas.

Bioenergy is a dynamic and emerging field that seeks to convert energy from the sun into fuels via plants and bioprocessing and conversion. Bioenergy is booming in Tennessee and the U.S. as we seek to displace foreign petroleum products with homegrown energy sources that also have a more favorable carbon and environmental footprint.



Plant biotechnology consists of genetic engineering and the molecular and cellular manipulation of plants and tissues. Biotechnology improves lives by enabling more efficient agriculture, better nutrition, a cleaner environment, and improved health.



Would you like to learn how food is grown? Would like to run your own plant nursery or greenhouse? Perhaps a winery and vineyard are in your future? Areas of focus include production of ornamental plants, fruits and vegetables; nursery and greenhouse management; and plant breeding. Horticulture scientists help improve crop yield, quality, nutrition, and resistance to pests and environmental stresses.



The Latest...

Dr. Maxwell Elsworth Springer, age 95, died October 11. A dedicated teacher and advisor in Plant and Soil Sciences from 1957 to 1979, Max started running in 1978. He received a lifetime achievement award from the Knoxville Track Club and was elected to the Greater Knoxville Sports Hall of Fame and USATF Masters Hall of Fame.

Sean Elverd Wins Golf Course Superintendents Association of America (GCSAA) award

GCSAA has awarded scholarships to 12 college students as part of the GCSAA Scholars Program administered by GCSAA's philanthropic organization, The Environmental Institute for Golf. Sean Elverd was the first-place winner in the competition. He received a \$6,000 scholarship and is honored as the Mendenhall Award Winner. Elverd, a senior from Chattanooga, Tennessee, is a turfgrass science and management major at the University of Tennessee.

New Positions Announced

The Department of Plant Sciences has announced two new positions. The first is a 12-month, tenure-track position in sustainable ornamental plant production and landscape management. This position will be 75 percent Extension and 25 percent research. The second position is also a 12-month, tenure-track position in the area of organic/sustainable and alternative crops research. This position will be 75 percent research and 25 percent teaching.

Beall Family Rose Garden Dedication

The UT Gardens recently dedicated the Beall Family Rose Garden. This is now the largest public rose garden in East Tennessee. The garden features two Tennessee sandstone waterfalls cascading into Japanese koi ponds and

more than 100 rose varieties ranging from disease-resistant shrub types to the latest hybrid-tea introductions. A 22-foot gazebo adds a special venue to the UT Gardens for holding weddings, receptions or other events. The Beall family established the rose garden in honor of their loving wife and mother, Mary Anne Beall. The Bealls are known throughout the area for their kindness and generosity. They share a passion for roses and hope their gift will inspire students, gardeners and visitors to the garden.

Dean A. Kopsell, an associate professor in the Plant Sciences Department, was lead author on a recently published article entitled "Increase in nutritionally important sweet corn kernel carotenoids following mesotrione and atrazine applications." This article was selected for a press release by the American Chemical Society in its ACS News Service Weekly PressPac for July 8, 2009. This weekly service provides leads on the latest advances in science and their impact on the business world and is released to more than 2,000 media outlets worldwide. Kopsell's ACS press release has prompted further summaries on such Web sites as Advocates for Agriculture and now appears on close to 100 Web sites around the world. In the article, the authors show that small doses of herbicides can benefit human nutrition by increasing healthy antioxidants in sweet corn. Kopsell and his colleagues hypothesize that minor stress from herbicides could also increase nutritionally important compounds in other vegetables.



Dr. Maxwell Elsworth Springer



Beall Family Rose Garden Dedication



Dean A. Kopsell

We would love to assure we have your current address. Please e-mail us at plantsciences@utk.edu with your current contact information. Thanks!

University of Tennessee Partners with AstroTurf® on \$1.5 Million Research Center

After more than a year of intense planning, the University of Tennessee has partnered with AstroTurf®, the iconic synthetic grass brand, to create the Center for Safer Athletic Fields, which will compare natural grass playing surfaces to synthetic surfaces. With the goal of improving athletic performance and reducing injuries, this initiative will provide the most comprehensive, ongoing comparison of synthetic surfaces to natural grass. This unique outdoor research facility will comprise 60 small-scale athletic research fields constructed from a variety of playing surfaces. UT turfgrass scientists will compare the safety and performance of synthetic playing surfaces to natural grass surfaces. Field qualities will range from those employed for professional-level sports to surfaces used by schools, public parks and recreation fields.

UT Research Shows That Plants Wield Genetic Weapons for Self-defense

Identifying chemical compounds associated with indirect plant defense and isolating their genetic origins are hot topics in the plant research world. At the UT Institute of Agriculture, **Dr. Feng Chen** and his previous Ph.D. student Joshua Yuan, along with a team of collaborators from the Department of Entomology and Plant Pathology and the Max Planck Institute for Chemical Ecology, have proven that chemicals emitted by injured rice plants serve as calls for help. The scientists showed that female wasps “smell” chemicals given off by rice plants that have been munched on by hungry fall armyworms and fly toward the plants in search

of the armyworms. When found, the unfortunate armyworm is killed and its carcass is used as a host for the wasp’s eggs. In other words, the rice plant signals that it’s in need of protection.

Kristin Abney took first place in the graduate student poster competition organized by the Herbs, Spices and Medicinal Plants Working Group (HSMP) of the American Society for Horticultural Science and sponsored by The Coca-Cola Company at the society’s 106th annual meeting held in St. Louis, MO on July 25-28. Kristin’s poster was titled, “Carotenoid concentration in Brassicaceae sprouts do not differ among genotypes.” The poster was co-authored by Dr. Dean Kopsell, Kristin’s graduate program advisor.

UT Professor Emeritus Co-edits Seminal Work

A new book co-edited by Henry Fribourg, a University of Tennessee professor emeritus, sheds light on the importance of watching grass grow. As it turns out, not only is the activity pretty interesting, it’s relevant to the health and welfare of livestock and ultimately the sustainability of the whole planet. The book, *Tall Fescue for the Twenty-First Century*, is the story of the rise in popularity of tall fescue as a turf and forage grass and of the scientific efforts to pinpoint the reasons that cattle consuming the popular grass fail to thrive and mares give birth to dead foals. The book details the effectiveness of collaborative research and of the United States’ land-grant university system.



UT Helps Tennessee Growers Pump Up Production at Pumpkin Field Day

Nothing says autumn like a bright orange pumpkin. On October 9, the University of Tennessee Institute of Agriculture showed how to grow the best varieties of these fall fruits at the Pumpkin Field Day. Pumpkin Field Day took place at the West Tennessee Research and Education Center in Jackson.

For more departmental news visit plantsciences.utk.edu/news.htm
For more undergraduate program news visit plantsciences.utk.edu/ug_news.htm

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Your Support Makes All the Difference

Did you know...

... most organizations, like *US News and World Report*, factor alumni giving into their evaluations when they rank universities? The national average for alumni giving is 12 percent. If just one out of every four UT alumni made a gift, we would double the national average!

... that every gift of every size enhances our department? When alumni collectively support the department it has a resounding effect on what we're able to do.

... giving is a profound expression of gratitude? If you have reached a point in life where you are able to appreciate all that you have and everything that contributed to your being where you are, giving back is one way to express your gratitude while helping others.

... gifts to the Plant Sciences Department Support Fund have an immediate impact on the department? They are used to support the area of greatest need, which can be equipment, student attendance at conferences and scholarships?

... you can designate your gift to any area you prefer? The Plant Sciences Department Support Fund is used to support the department's areas of greatest need, but you can also designate your gift to support the area that matters most to you – undergraduate scholarships, graduate scholarships, research, etc.

We each have our own reasons for choosing to support our alma mater. Maybe it's a favorite memory or favorite professor. Maybe you met your spouse or best friend here. Maybe you received a scholarship as a student and want to "pay it forward." Regardless of your reason and regardless of the amount, consider making an annual contribution to the department. We are very grateful for your support and would not be able to do many of the things we do without it.