

Summer 2004

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SOUTH CAROLINA URBAN & COMMUNITY FORESTRY COUNCIL

# The Acorn

In simplest terms, drought can be defined as a deficiency in precipitation over an extended period of time. But what constitutes a deficiency? And, what length of time is needed to turn a dry spell into a drought? To answer these questions, scientists measure and track the rainfall patterns of geographic areas across the globe to develop drought indices that numerically indicate when a drought is at hand. When precipitation levels decline and deviate from historical norms, we have a drought.

There are many indices that are used to measure drought. One, the Palmer Drought Severity Index (PDSI), is useful to government agencies in determining when and where to administer drought relief assistance. At this writing, the PDSI shows a moderate drought in parts of the upstate of SC, while the rest of the state is at near normal levels of precipitation. However, many drought planners and resource managers, who make decisions that affect a community's water usage, prefer another, the Standardized Precipitation Index (SPI). Whichever index is followed, the tools are there for everyone from the government official to the local farmer to evaluate the drought status

## Weathering Drought

of an area at any given time.

As caretakers of our urban forests, drought is a serious matter that we must prepare for and respond to, whenever it arrives. When a drought index drops below a certain threshold, we may decide to review our irrigation schedules, but beyond that there is little that an index can do for us. In fact with trees, their best defense against drought lies in the decisions we make and the actions we take all

along the way. Considerations such as species selection, mulching, limiting competing vegetation, and watering are the contributions we can make to help a tree weather a drought.

*Jeff Lane is the 2004 SCUCFC Chair and a Utility Forester for Santee Cooper.*



## from the Chair's Corner

It is almost impossible to believe that my term as Chair is at its midpoint. The months have passed by at an astounding rate. However, I am pleased to report that much has been accomplished and I am excited about what is to come.

During our spring Board meeting, we heard from Bob Schowalter, our State Forester. Thanks, in part, to the Council's lobbying efforts, our Governor and legislators abandoned the reorganization of the SC Forestry Commission into an environmental and wildlife mega-agency. The mission of the Forestry Commission and urban forestry, in particular, were preserved and budget cuts may not be nearly as devastating as first predicted.

George Sawyer, Treasurer, reported on our own financial state and presented a balanced budget for the year. The Council was able to increase the amount of money devoted to scholarships for students of urban forestry by finding ways to reduce our expenses.

Bob Vecchio and the conference committee are putting the final touches on our joint 2004 Annual Conference with SCAPA to be held November 10-12. I think you'll find

it one of the most informative and action-packed conferences in years.

Our new Executive Coordinator, Mary Leverette, outlined a marketing plan for the upcoming months. Increasing membership is a top priority. Our voice in protecting SC forests can become stronger as more members are added. I encourage each of you to recruit members. If each of us brings a colleague or friend or neighbor to the Council, we will ensure that we are heard in Columbia and in our communities.

The Council will be reaching out to decision makers through mailings, press releases, and personal visits to strengthen our message. South Carolina's urban and community forests are vital to our state's economy, health, and natural beauty.

I wish you a summer filled with long, cold drinks enjoyed under a leafy shade tree.

*Jeff Lane*



## [www.scurbanforestry.org](http://www.scurbanforestry.org)

One of the quickest ways to stay informed about the SC Urban & Community Forestry Council is to log-on to our website, [www.scurbanforestry.org](http://www.scurbanforestry.org).

The site is updated weekly with news about urban forestry, membership events, and funding opportunities.

You'll also find a quick and easy-to-use format for asking questions or re-

questing information about urban forestry or the Council.

The site will be undergoing some additional improvements in the coming months.

Bookmark [www.scurbanforestry.org](http://www.scurbanforestry.org) as one of your favorites and visit us often!

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*The Acorn* is a quarterly newsletter produced by the South Carolina Urban and Community Forestry Council. We welcome your articles, news items, stories, photographs, and other items that may be of interest to our readers. Items may be sent to SCU&CFC, PO Box 21707, Columbia, SC 29221 or [info@scurbanforestry.org](mailto:info@scurbanforestry.org).

# The Effect of Drought on Tree Roots

## An interview with Dr. Christina Wells

When dry weather settles in, the effects it has on trees are often quite visible above ground. But what happens to the tree roots that are hidden below the surface? We asked Dr. Christina Wells, Assistant Professor of Horticulture, of Clemson University, a few questions to try to get to the root of this topic.

**Acorn:** *In general, what effect does drought have on trees?*

**Dr. Wells:** A tree becomes drought-stressed when lack of precipitation causes the tree's water demands to outstrip soil water supply. During times of drought stress, trees close their stomates (microscopic pores on the leaf surface) to avoid excessive water loss through their leaves. However, this also prevents CO<sub>2</sub> from entering the leaves and thereby reduces photosynthesis. Under these conditions, the tree lives mainly off stored carbon reserves. This is not the end of the world, provided the drought does not continue for too long. In fact, there is some evidence to suggest that short periods of drought reduce growth and redirect the tree's resources toward defense. Not a bad thing for trees in the landscape.

**Acorn:** *So trees are built to adapt to occasional droughts. What happens if the drought continues?*

**Dr. Wells:** Eventually, the tree's energy reserves run low, and both growth and defense are

impaired. As the drought continues, pests and pathogens will be able to successfully overcome the tree's defenses and colonize the tree. Our recent Southern pine beetle problem was an excellent example of this.

**Acorn:** *When a tree encounters a drought, what are the first things to happen below the surface, within the roots?*

**Dr. Wells:** Drought initially causes roots to produce a hormone called ABA. This hormone travels to the leaves where it shuts down leaf growth and closes the stomates: battening down the hatches, as it were. By reducing leaf growth, the leaf surface area for water loss is kept to a minimum. By closing the stomates, water loss per unit leaf area is reduced. At this point, root growth is not necessarily impaired. It can even be stimulated as roots search for water under dry conditions.

**Acorn:** *And as the drought worsens, what happens?*

**Dr. Wells:** As the drought continues, roots are no longer able to generate low enough water potentials to draw in water from the soil. The finest root elements may die or may undergo a process of suberization by which they seal themselves off from the drying soil. The tree begins to suffer a number of harmful effects, usually in the following order: reduced above ground growth, impaired protein synthesis, reduced photosynthetic levels, heat stress (due to inability to dissipate heat via transpiration), free radical formation, and oxidative damage to leaf tissues.

**Acorn:** *Is a drought index useful to those of us who plant and care for trees?*

**Dr. Wells:** In general, drought indices are not designed for use by urban foresters. Limited soil volumes, the presence of hardscapes, the use of irrigation systems, etc. mean that water availability in urban soils may not strongly reflect recent precipitation patterns. However, it is useful to be aware of the drought index and to review irrigation schedules when the index drops below a threshold value.

**Acorn:** *What are some ways that the non-scientist can monitor drought and make decisions about when and how to intervene?*

**Dr. Wells:** In many cases, the best method of assessing soil water status is the simplest. Collect a small soil sample beneath the tree of interest and roll/squeeze the sample into a ball in your hand. If the soil doesn't mold into a ball, it is too dry and should be irrigated. If the soil forms a ball that crumbles slightly when rubbed, soil water content is adequate. If the ball doesn't crumble when rubbed, the soil is too wet.

Another quick method is to feel the trees leaves. If they are cooler than the air temperature, then the tree has adequate water and is transpiring. If they are warmer than the air temperature, then the tree has closed its stomates in response to water limitation.

*Photo above left: The growth and leaf patterns of this tree indicate a specimen in drought stress.*



# MULCHING TREES

In forests, trees grow in groups. The forest trees shade out competing vegetation, such as grass, and share their nutrients each year as they shed leaves and other parts. A rich diversity of plants, animals, and microorganisms can be found in forest soils. These organisms live on the food shed from trees. They, in turn, help to aerate the soil and recycle nutrients. An undisturbed forest soil is deep, rich, and well aerated. Trees growing on urban sites live in a very different environment. The soil is usually shallow, compacted, and comparatively sterile. Leaves are raked and removed every year, and turfgrass competes with trees for water and minerals. Mulch can help a soil to recover, and can provide a friendly root environment for trees by insulating the soil, inhibiting grass and weed growth, conserving moisture, recycling minerals, and providing a better environment for soil organisms.

## What Kind of Mulch?

The mulch found on the forest floor is made up of shed leaves, twigs, etc. This material naturally decomposes over a few months. The most natural mulch to use, therefore, would be composted leaves or other woody material. Fresh material can be used as well, but it may use nitrogen from the soil as it decomposes. Fertilization can be used to replace the nitrogen.

The mulch should be coarse enough to allow easy passage of air and water to the soil. Avoid sawdust or fresh hardwood leaves that can pack down and prevent the flow of air and water into the soil. Pine straw, pine bark, or shredded bark products work well and are readily available. Be careful with pine straw near buildings, since it is very flammable.

## How Much Mulch?

The standard recommendation is a depth of two to four inches. Coarser mulches should be a bit deeper than fine mulch and allow for settling. Over-mulching can cause problems and even

prove harmful to the trees. Mulch as wide an area as possible. Even a narrow ring of mulch can help, by keeping string trimmers way from the trees, but a mulch bed out to the drip line of the tree or beyond is preferred.

## How to Apply Mulch

When mulching in a lawn, it is preferable to kill any turfgrass and weeds before applying the mulch. Many safe herbicides are available to do this.



Mulch wide not deep.

Spread the mulch over the desired area, keeping it from touching the trunk of the tree.



"Mulch volcanoes" cause many problems for trees.

Do not pile up mulch around the base of the tree, as it can cause disease problems. If a coarse, non-composted mulch is used, it would help to spread a thin (1/4 to 1/2 inch) layer of compost on the soil first, then cover with the other mulch. Add additional layers each year to maintain the proper depth. Control grass and weeds by pulling or by using approved herbicides.

*Jimmy Walters is a Regional Urban Forester with the SC Forestry Commission.*

# Selecting Drought Resistant Trees

Drought resistant tree selection is a long-term solution for communities with low rainfall totals. Drought resistance specimens use water efficiently, and continue to grow and make food at relatively low water concentrations. Characteristics of these trees include extensive root systems, thick leaf waxes and bark.

As you select trees for planting this fall consider these suggestions:

## Use Natives

Native trees adapted to local soil, moisture, climate and pests usually perform better over the long run than exotics.

## Select Proper Canopy Type

Select trees for planting in full sun which will develop leaves and branches spread throughout a deep crown. These multilayered trees have many living branches with many leaf layers. Multilayered canopy trees are more water efficient in areas with greater than 60% full sun. The other type of leaf canopy concentrates leaves in a single layer along the outside of the canopy area. These single-layer trees are good in partial shade but are not water efficient in full sun.

Examples of multilayered overstory trees include: oaks, pines, soft maples, ash, hickory, gums, walnut, poplars, and birches. Mono-layered understory trees include: beech, sugar maple, hemlock, magnolia, sassafras, sourwood, and redbud.

## Select Proper Crown Shape

Crown shape has a great effect on heat dissipation and water use. Ideal trees would be tall with cone or cylinder shaped crowns. Do not use flat, widely spreading species in full sun. You want a tree to maintain a tall, rather than a wide appearance. Many trees that are wide-spreading when mature have narrow, upright crowns when young.

## Select Proper Leaf Size and Shape

Select small-leaved or small, deeply lobed leaved trees. These leaves are more easily cooled and have better water use efficiency than larger leaves.

## Select Proper Foliage Reflection

Hardwood (broadleaved) trees reflect

25% more light than conifer trees on average. This translates into better water use efficiencies with hardwoods.

## Select Upland Vs. Bottomland Species

Upland species are usually more drought resistant than bottomland species. Unfortunately, upland species can be much slower growing and do not react well to site changes and soil compaction. Tree selection must be carefully made based upon disturbance, stress, and site-use expectations.

From these characteristics you see that the ideal tree for a drought-resistant landscape is a native, upland hardwood species with a multi-layered canopy, small and/or deeply lobed leaves, and a narrow or upright crown shape.

Remember young trees of any species must be allowed time to become fully established in a landscape before drought resistant features will be evident. Obviously you will never find an ideal drought resistant tree. Many trees do come close and have many fine features for a good landscape. A list of these species can be found in the following table. Properly fit the tree to your site and local climate, and you will have a water efficient landscape.

## Natives

<i>Acer saccharum ssp. Floridanum</i>	Southern sugar maple
<i>Acer saccharum ssp. Leucodermev</i>	chalk maple
<i>Carya glabra</i>	pignut hickory
<i>Carya illinoensis</i>	pecan
<i>Celtis laevigata</i>	sugarberry
<i>Corylus Americana</i>	American filbert
<i>Cotinus obovatus</i>	American smoketree
<i>Diospyros virginiana</i>	common persimmon
<i>Fraxinus pennsylvanica</i>	green ash
<i>Ilex opaca</i>	American holly
<i>Ilex vomitoria</i>	yaupon holly
<i>Juniperus virginiana</i>	Eastern redcedar
<i>Nyssa sylvatica</i>	blackgum
<i>Ostrya virginiana</i>	Eastern hophornbeam

<i>Persea borbonia</i>	redbay
<i>Quercus shumardii</i>	Shumard oak
<i>Quercus virginiana</i>	live oak
<i>Rhus copallina</i>	shining sumac
<i>Sabal palmetto</i>	cabbage palmetto
<i>Taxodium distichum</i>	baldcypress

## Cultivars and Non-Natives

<i>Acer x freemanii</i> 'Jeffersred'	Autumn Blaze® Freeman maple
<i>Cercis reniformis</i> 'Oklahoma'	Oklahoma redbud
X <i>Chitalpa tashkentensis</i>	chitalpa
<i>Cryptomeria japonica</i>	Japanese cedar
<i>Ginkgo biloba</i>	ginkgo
<i>Ilex x</i> 'Nellie R. Stevens'	'Nellie R. Stevens' holly
<i>Ilex x attenuata</i> 'Fosteri #2'	Foster's holly
<i>Koelreuteria paniculata</i>	golden raintree
<i>Pistacia chinensis</i>	Chinese pistache
<i>Rhus copallina</i> var. <i>latifolia</i>	flameleaf sumac
<i>Robinia pseudoacacia</i> 'Purple Robe'	'Purple Robe' black locust
<i>Ulmus parvifolia</i> 'Drake'	'Drake' Chinese elm
<i>Zelkova serrata</i>	Japanese zelkova



*Carya illinoensis*

# Annual Conference

One of the goals of the SCUCFC Board of Directors is to partner with other state organizations to promote urban forestry. In 2003, a partnership was formed with the South Carolina Chapter of the American Planning Association (SCAPA) to exchange ideas and knowledge while expanding our base of influence.

This year's Annual Conference will be a joint venture between SCUCFC and SCAPA. Registration is \$125 and sleeping rooms are \$99 per night for registrants.

Kathleen Wolf, Ph.D, College of Forest Resources, University of Washington will present the Keynote Address at noon on Wednesday, November 10 and an additional presentation scheduled for Thursday. Dr. Wolf consults and works with Urban Foresters, Arborists, Planners, and various

governmental agencies across the country regarding the economic impact of urban forests. Her presentations are always packed with timely information and good advice.

Two tracks for SCUCFC and SCAPA members will run concurrently on Thursday and Friday. Topics will be varied, yet specific, and the sessions will be open to members of either organization. Outdoor labs and tours will also be held on Thursday and Friday. Speakers will include representatives from Davey Tree Resources, Clemson University, Sandhill Center for Community and Economic Development,

and South Carolina Forestry Commission. Entertaining social activities are also set for the evenings of the conference.

You will continue to receive updates about the conference this summer with complete registration information sent in early autumn.

If you have any questions or would like to become a sponsor or exhibitor, please contact any

Board member or Executive Coordinator, Mary Leverette, [info@scurbanforestry.org](mailto:info@scurbanforestry.org).

**2004 Joint Annual Conference**  
**November 10-12**  
**Crowne Plaza Resort**  
**Hilton Head Island**

## **3rd Annual Bicycle and Pedestrian Accommodations Conference**

The South Carolina Department of Transportation and the SC Division of the Federal Highway Administration will host this annual conference in Myrtle Beach, SC, October 24-26, 2004. Sessions will include Facility Design and Funding Options. For more information, contact Timothy Edwards, [edwardsft@dot.state.sc.us](mailto:edwardsft@dot.state.sc.us).



**Someone's sitting in the shade today because someone planted a tree a long time ago.**

Warren Buffett

## In Remembrance

Deborah Man-Yee Lieu, 45, of Goose Creek, passed away suddenly on Monday, March 15, 2004.

Deborah received her Bachelor of Arts and History Degree from Clemson University and her Masters Degree

in City and Regional planning from Clemson University in 1983. She was the City Planner for the City of Goose Creek from 1991 until her death.

Debbie was a long-time friend of urban forestry and will be missed.

Memorial contributions may be made to TriCounty Ministries, 3349 Rivers Avenue, North Charleston, SC 29405.



# 5th ANNUAL SC ARBORIST SERVICE DAY A ROUSING SUCCESS!

The 5th annual Arborist Service Day was held March 6, in Spartanburg at the South Carolina School for the Deaf and the Blind. The event was sponsored by the Southern Chapter, International Society of Arboriculture; the South Carolina Urban and Community Forestry Council; the SC School for the Deaf and the Blind; and the South Carolina Forestry Commission.

Established in the Cedar Springs community near Spartanburg in 1849. The trees on the SCSCB campus had weathered many a wind or ice storm, and some had deteriorated badly. With the recent state budget cuts, the school has very limited resources for dealing with tree problems. The South Carolina Division of the ISA's Southern Chapter scheduled Arborist Service Day to correct some of the most urgent tree hazards and to begin to establish the next generation of trees.

Five tree service companies and a landscape company joined dozens of volunteers to rehabilitate and plant trees on the historic campus. Eight large, hazardous trees were removed, and fifty-seven new trees were planted on the campus. Three Certified Arborists supervised volunteers in pruning smaller trees and shrubs, while two other Certified Arborists supervised volunteer tree planting crews. The landscape contractor hauled and spread mulch as school personnel constantly hauled tools, trees, and refreshments. Meanwhile, the tree service companies used bucket trucks and climbers



Above: Eastern Arborist Tree Service of Enoree takes down a hazardous oak tree.

for the takedowns, crown restorations, and crown cleaning work on the larger trees. Students from

Spartanburg Technical College and Clemson University students cleaned and rehabilitated an overgrown nature trail on the campus.

A barbecue lunch was provided by the school, and door prizes were given, donated by local businesses and the SCSDB.

Tree service companies sending crews included Schneider Tree Care of Greenville; Eastern Tree Service of Enoree; Grant Tree Service of Gaffney; Layton Tree Service of Concord, NC; and Asplundh Tree Expert Company (contracting with Duke Power). Guardian Landscape Service of Spartanburg provided manpower, tools, and equipment for mulching new and established trees and shrubs all around the campus.

Volunteer groups included Spartanburg Master Gardeners, the Spartanburg Lions Club, Boy Scouts, SCSDB staff, the Clemson

Student Society of Arboriculture, and the Horticulture Clubs from Clemson University, and Spartanburg Technical College

A number of donors helped make the Service Day possible. Major funding was provided by Mr. Roger Milliken and by the SC Urban and Community Forestry Council. Door prizes were provided by Irwin's Ace Hardware, Economy Feed and Seed, Cutters Supply, Nodine Small Engines, Vermeer Mid-Atlantic, the Walker Foundation, Church of the Advent, Krispy Kreme Doughnuts, Bi-Lo, Big Jim's Bubba Q and Tool Shack, Jack Bundy, Norma Monserate, and the SC School for the Deaf and Blind. Trees were donated by Christmas Pines Tree Farm of Mountville; Fairforest Nursery and McMakin Nursery of Inman; Roebuck Greenhouses of Roebuck; and Piedmont Farm Supply of Spartanburg.

*Liz Gilland is the Urban Forestry Coordinator with the SC Forestry Commission.*



L to R: ISA Certified Arborists Dennis Haigler (Columbia), Liz Gilland (Camden), Deborah Johnson (Columbia), Lois Edwards (Conway), Joel Felder (Lexington), and Clark Beavans (Rock Hill) under a newly mulched tree. All are long-time U&CF Council members!



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## A 'Blaze' That Won't Scorch

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When dry weather turns to drought, we begin to see young trees with sagging, scorched leaves, lawns that snap, crackle, and pop under our feet, and blazing wildfires that rage through arid forest fuels. These uninvited wildland blazes are unwelcome in any season. However, there is an autumn blaze that you can, and perhaps should, invite in to help you fire up your community forests in a different way.

Autumn Blaze® Freeman maple, or *Acer x freemanii* 'Jeffersred,' is a maple selection that has been grown in US nurseries for years, but you may not be familiar with it. A cross between red maple and silver maple, 'Jeffersred' is a fast-growing hybrid that combines the virtues of the parent species, while passing on few of the inherent vices. According to a variety of sources, 'Jeffersred' grows faster and weathers drought better

than red maple, but it retains the fiery autumn glory of the species. The leaves of 'Jeffersred' resemble those of the silver maple but, this tree produces wider crotch angles and develops a central leader and a branching habit that may hold the tree together better under the stresses of wind, ice, and rain.



Like silver maple, the roots grow aggressively and may pose the same lawn-mower damaging, foot-tripping surface roots that can be experienced with *A. saccharinum*. Pest problems include those that commonly affect both red and silver maples, but the vigorous growth of the hybrid may help fend off troubling insects or diseases. That said, the Asian Long-horned beetle could be a bane to 'Jeffersred,' just as it is to the other maple species and hybrids.

While working as the urban forester for the City of Fayetteville, NC, I participated in a U&CF grant-funded project implemented by researchers from NC State University Cooperative Ex-

tension Service. The Urban Tree Evaluation Program ([www.ces.ncsu.edu/fletcher/programs/nursery/ncutep](http://www.ces.ncsu.edu/fletcher/programs/nursery/ncutep)) established a rich variety of tree species and cultivars, including 'Jeffersred', in 14 locations across the state to study the trees' adaptabilities to urban environments. While I left Fayetteville seven years ago, during the three years I observed them 'Jeffersred' established easily with no watering beyond the initial planting. The tree grew fast, remained consistently lush-green in the summer heat, and blazed in the fall as expected.

Fayetteville, like much of South Carolina, swelters in the summertime. From what I've seen and read, 'Jeffersred' is a stellar choice for South Carolina communities, particularly the parched ones that see more sizzle than drizzle. Try 'Autumn Blaze.' You won't get burned.

*Jeff Lane is the 2004 SCUCFC Chair and a Utility Forester for Santee Cooper.*

*Note: If you have had experience with 'Jeffersred' and have any comments, corrections, or stories to tell or if you have a perspective on a particular urban tree that you would like to share with SCUCFC please email me at [jllane@santecooper.com](mailto:jllane@santecooper.com).*

