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In This Issue:

Evaluating the Use of i-Tree ECO in the Southeastern US

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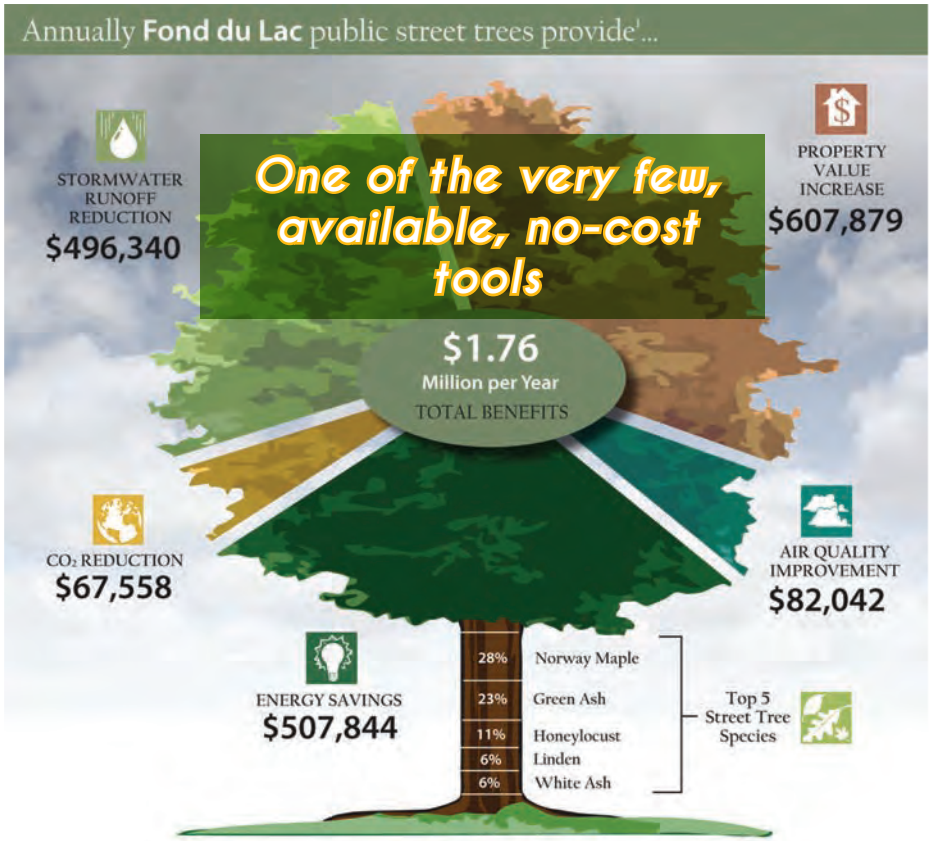

English Version

The i-Tree software and its models and utilities are one of the very few, available, **no-cost** tools that provide relatively easy and science-based means for communities to assess the amount, type, characteristics, benefits and management needs of their urban forests. It uses standardized urban forest inventory data from street segments or sampling data from random plots located throughout a city. With this data,

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Versión española

El software de i-Tree ha estado disponible desde hace varios años. Hasta la fecha, es una de las pocas herramientas disponibles para las comunidades **sin costo**, y que proporciona información relativamente fácil de entender basada en métodos científicos. Se utiliza para evaluar la cantidad, el tipo, las características, así como los beneficios y necesidades de manejo de los bosques urbanos. Utilizando

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A Message From the President

Hello to all Tree Care Professionals,

I hope this message finds you all in good spirits and with plenty of work out there along with the rewards of promoting tree health and educating the public on proper tree care. Please remember to keep your work habits constantly focused on safety. It is, unfortunately, true that increases in productivity can also lead to increases in accident frequency. Don't let this happen to you! Think safety!

First, as you all know, the Trees Florida Conference in Fort Lauderdale Beach was a success. Total attendance was estimated around 300, up from last year. My appreciation and gratitude goes out to all the speakers, Trees Florida and the Education Committees, board members and all those volunteers. A special thanks to our Florida Chapter ISA CEO, Norm Easey and staff... Patty and Jan.

Don't forget, even though the ISA International Conference and the Tour des Trees in Toronto has past by publication date, you have until August 31st to donate to support your favorite rider or team in the Tour des Trees bike race. Funding raised here goes to the Tree Research and Education Endowment Fund (TREE Fund). We are proud that Scott Davis and Andrew Kittsley rode for Team Florida this year. This will be Andy's 17th year as a rider representing the Florida Chapter; he has ridden his bicycle at least 48,000 miles! Please support our riders who can use both funding and encouragement.

Now for the 'why' the TREE Fund is important. If you keep up with tree news and live in Florida, trees and plants are being subjected to decline caused by insects and diseases. This pattern is occurring more frequently and is becoming a concern as well as the rest of the states. On average we see a new pest and/or disease each month entering Florida by way of our ports or out of state. We are dealing with many more tree and palm problems than ever. With the diverse tree canopy in the state of Florida we are constantly challenged to find species that fair well under adverse climate conditions. Your donation to the TREE Fund is one way to keep research and education as a priority here in Florida.

For information on the new Tree Risk Assessment Qualification(TRAQ), please keep in touch with our chapter website and newsletter. As a reminder, TRAQ is a new ISA qualification program which will follow the methodologies outlined in the ISA Best Management Practice for Tree Risk Assessment. There is a TRAQ class and exam being scheduled for November in the Tampa area.

As we work to improve our Florida Chapter, we encourage your involvement and welcome your feedback. I look forward to what we will accomplish together.

As Arborist and Tree Care Providers.....the more people we reach the better our environment will be!

Best Regards,
Patrick Miller
Florida Chapter President

"A tree is beautiful, but what's more, it has a right to life; like the water, the sun and the stars, it is essential. Life on earth is inconceivable without trees." Anton Chekhov .

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Consultant's Corner

by Joe Samnik, Consulting Arborist

THE MORE THINGS CHANGE THE MORE THEY STAY THE SAME

The title is certainly an old play on words and, perhaps correctly, states the fact that no matter how radical a change the underlying components remain the same, as do the consequences. Such is true in many industries and ours is no different. Take the ANSI A300, (Part 9), and the companion publication, Best Management Practices (BMP) Series *Tree Risk Assessment*, regarding the assessment of tree risks.

We look now to a plethora of new changes. We find ourselves in a *fait accompli* that will change the way we assess trees. No longer is a tree hazardous; the tree now has certain levels of risk associated with it. The dangerous parts of a tree are hazardous, but not the entire tree; it is risk assessment in categories. Regardless of how we have assessed trees in the past we need to change with the industry and prepare ourselves by becoming qualified. This new qualification will address the subjectivity of tree assessments and train us to determine if a tree is safe to live under or recreate near. This specified training and instruction will give us the tools we need to determine a tree's level of risk. Our gambling days could soon be over; tree risk assessment will no longer be a crap shoot. Is the tree going to fail? Ladies and Gentleman, *faites vos jeux*, please!

If you assess trees for their risk of failure you will certainly want to consider obtaining this new designation; otherwise you will find yourself at the preverbal gambling table while the rest of your colleagues are no longer taking bets. After you have received your *Tree Risk Assessment Qualification* (TRAQ) you will have learned and mastered an entirely new realm of tree assessment protocol. This new approach to tree assessments is a big departure from the now obsolete, hazard tree appraisals. It is going to be a significant learning curve for many of us. It will not be as easy as booking an appointment at *Ollivanders Wand Shop* in *Diagon Alley* to assist you in predicting failures of trees. You will have to put forth the effort to attend and successfully complete the two day training and pass an exam. Your investment of time and effort will pay off in the end; you will have the skills and necessary training needed to detect defects in a tree. Let's face it, as professionals we must always be looking for ways to put some new letters after our name and better resemble the label on a can of alphabet soup it is what separates us from the pack.

One very important difference in the new approach to risk management is the nuance that it is the Duty Holder (e.g. the tree owner or owner of the land that the tree is growing) that makes the call on what happens to the tree in the after situation of your risk assessment. The arborist no longer dictates what should happen to the tree. You can certainly offer an opinion as to what you think the proper course of action is to take (e.g. removal, pruning, etc.) but in the final analysis the decision falls to the Duty Holder, not the arborist. First the risk assessment is conducted by the arborist, then the decision of what to do by the Duty Holder. This component of the tree risk assessment has raised great debate in our professional circles. Every pundit worth his weight in chain saw safety is entering this debate or discussion very carefully dissecting the perception of risk that is allowable in their lives.

The "Greatest Boxer of All Time", Mohammad Ali, is quoted as saying, "Everybody has a game plan until I hit them". And so it is with attorneys in wrongful deaths and personal injury. The scorched-earth, take no prisoners, professionals look to risk and resultant perceptions associated with taking risks in a different light than we do. One way they view an incident

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The More Things Change continued from page 5

involving injury or death is through the legal lens of negligence, and the four components thereof. When utilizing your new qualification be sure not to omit your opinion of what the Duty Holder ought to do-even if there is no obligation to do so. Remember that opposing counsel always has the huge advantage of hind sight, and constructive knowledge (that which you know or should have known had you taken the reasonable amount of time to find out). He/She also has the advantage of a very injured plaintiff, or worse, pictures of the decedent. What guide lines you correctly followed in your risk assessment pale in comparison to what levels of responsibility you are held to in a deposition. Every time you conduct a tree risk assessment you should be asking yourself questions of why you are doing certain things a certain way and why you reached a certain decision-just as if your every step was being scrutinized in a deposition or at trial; when doing risk assessment, it probably will one day.

More and more changes are taking place in our industry but one thing is a sure bet; in the courtroom things are pretty much staying the same.

Watch for this year's Trees and the Law Seminars which will be presented by the Florida Chapter this August.❖

Davey Tree Announces New Vice President

Kent, Ohio — The Davey Tree Expert Company has announced the appointment of Don Winsett to Vice President of National Business Development.

Pat Covey, Davey's chief operating officer, said the appointment was an opportunity to identify and bring opportunities to Davey operations throughout the country. "Our clients will benefit from Don's experience and contacts in the landscape and tree care industry," said Covey. "Furthermore, his understanding of the needs of large commercial clients will assist in our ability to provide tailored, comprehensive property management solutions for them." Winsett comes to Davey with about 20 years in the industry, including time spent at ValleyCrest, Brickman and his own Florida-based grounds maintenance company that grew to more than $20 million before it was sold. Winsett serves on the Board of Directors and is a past president of the Florida Chapter of International Society of Arboriculture. He has been the Chair of the Sustainable Urban Forest Coalition since 2009.

Don will be sharing time between Ohio and Florida and will remain committed to the Florida Chapter ISA. Congratulations Don on your big step up! Editor

News From International

Results of the ISA Board of Directors Elections

The ISA Board of Directors is an elected board of 15 Directors. ISA members vote on eight of the Director positions in a general election, and five of the Director positions are filled by an election from within the Council of Component Representatives. The President/Chair of the Board and President/Chair-Elect are each elected for their terms of office from within the Board of Directors by the current Directors.

The terms for the following elected positions begin in August 2013 in conjunction with the ISA Annual International Conference and Trade Show in Toronto, Ontario, Canada, and will end in August 2016.

Elected by the ISA Membership:

- Francesco Ferrini, Full Professor of Arboriculture/ Green Areas Management, Department of Agri-Food Production/Environmental Science, Italy Chapter; Francesco is serving his second, three-year term.
- Brian Kane, Professor, Department of Environmental Conservation, University of Massachusetts, Amherst, U.S.; ISA New England Chapter; Brian is serving his first, three-year term.
- Michael Marshall, Marshall Tree Farm, Morriston, Florida, U.S.; ISA Florida Chapter; Michael is serving his second, three-year term.

Elected by the Council of Representatives:

- Pedro Mendes Castro, Avenida Professor Candido Holanda, Brazil; ISA Brazil Chapter; Pedro is serving his first, three-year term.
- Michelle Mitchell, Professor, Oakland Community College, Lapeer, Michigan, U.S.; ISA Michigan Chapter; Michelle is serving her second, three-year term.

Many thanks to those of you who participated in this election. The Board of Directors is here to represent your interests, and your input is of great value in the election process.

Click here to view a complete listing of the current ISA Board of Directors. ❖

You're a municipal forester and you're proud of your urban forestry program. You want to see it continue to grow and improve. Why not let your Mayor and Council know how well you're doing? You know how they love recognition and, hey, if they're happy....well, you know the rest!

You need to have your program accredited by the SMA. Show that your program compares to the best standards in urban forestry. It's now a lot easier and quicker to do. Apply once and renew annually.

Your mayor will get a plaque for his or her wall. You'll get the satisfaction of job security, budget justification, and respect. It's a win-win situation for all.

www.urban-forestry.com

SMA Accreditation

sma ACCREDITED Urban & Community Forestry Program

SOCIETY of MUNICIPAL ARBORISTS Executive Director: Jerri J. LaHaie, CAE PO Box 641 Watkinsville, GA 30677
Tel: (706) 769-7412 Fax: (706) 769-7307 Email: urbanforestry@prodigy.net

TREE Fund Update

TREE Fund Auction A Success in Toronto!

Vacations were a HOT item at the TREE Fund auction in Toronto during the International ISA annual conference! The Florida Chapter donated a Holland America cruise of the winner's choice for two for up to 10 days. Someone is dreaming of a sweet vacation now! Proceeds from the auctioning of the cruise go to the TREE Fund as part of the Florida Chapter Challenge.

Another sweet dream donation was provided by John and Darlene Harris of Miami. They donated a stay at their lovely Cardinal Hill Bed and Breakfast in scenic Mansfield, PA. Thanks to the Harris family for the great addition to the auction!

If you have a great idea for next year's donation items to the TREE Fund auction, make sure to drop us a line!

Now Accepting Duling and Kimmel Grant Applications

Note: Due to the similarity of the Jack Kimmel International Grant and John Z. Duling Grant, TREE Fund requests that applicants submit to only one of these programs per unique project and funding cycle.

Applications are due October 1 and will only be accepted through the online application forms found at.

http://www.treefund.org/grants/research-grants/duling
http://www.treefund.org/grants/research-grants/kimmel

PSI:
PLANT SCENE INVESTIGATION

The ISA Florida Chapter is beginning this new article series as an engaging way to share information about the diseases, damage, pests, nutrient deficiencies and other maladies that can affect our Florida Trees, and how to diagnose them. This article will feature a real-world scenario encountered by one of our members. You as a reader will be given information including the location, species, recent activities and photos of the tree, and your challenge is to correctly diagnose the problem, and recommend a treatment! Some of the articles will allow you to submit your diagnosis to the email address at the end of the article – the first person that submits the correct diagnosis will be recognized in the next issue of the Florida Arborist, along with the "official" answer for the rest of us, including a description of the clues that could be used to make the correct determination. And now, on to our first case:

PSI Case No. 1

Approximately six months after a landscape contractor relocated six royal palms (Roystonea elata) within a commercial site, the site manager observed that they were all in varying degrees of stress/decline, evidenced fronds withering/dying more rapidly than typical, leaving the crowns with few viable fronds. The palms were installed in three foot by three foot tree wells and covered with landscape stones, which were surrounded by a concrete-paved courtyard for at least 20 feet on each side. The site manager wanted to know whether the decline observed in the palms was due to site maintenance issues or whether the palms had been transplanted incorrectly. The manager asked the consulting arborist to review the site conditions and maintenance activities and to make a determination as to who was at fault for the palms' decline. No specifications for or photos of the relocation were available, and the only scheduled maintenance was the removal of dead palm fronds.

What factors did the arborist examine and what was the final diagnosis?

Issue: Decline of recently relocated royal palms

Date: Planted March, observed in September

Location: Private development site in Miami, FL

Trees affected: Roystonea elata (royal palm)

Photo 1
Example of palm canopy indicating decline

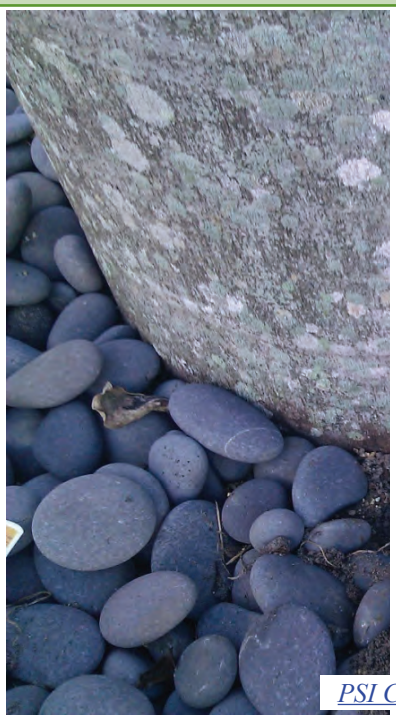

Photo 2
Example of base of palm in planting well

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PSI Case No.1 continued from page 14

PSI Case No. 1

Answer: The palms had two major issues: they were planted too deep and were severely under-watered, with no irrigation system installed. The root initiation zone on each of the palms was at least six inches below the soil surface, and had landscape stones on top of that. In this respect, the landscape contractor was at fault for installing the palms too low. However, the site manager had also never watered the palms - not immediately after transplanting and not on a routine basis since. This lack of irrigation was exacerbated by the fact that the concrete paved surface further reduced the available water, directing surface flow to storm drains. In this regard, the site manager was at fault. Neither party had a clear understanding of their responsibilities in the project to identify and carry out the transplanting and maintenance. The two therefore privately decided on a sharing of the cost of replacing the palms, and agreed to have a landscape professional specify the new planting and maintenance specifications.

Clues to making this determination:

1. The palms were newly installed, so issues such as nutritional deficiencies likely would not have taken affect.
2. Royal palms typically grow best in soils that have high moisture - in the wild they grow in wetlands. Use of tree wells restricts available water and concrete does not typically allow water to infiltrate. No yellowing of the fronds or other signs of disease are evident from the photos.
3. Availability of water is consistent with a decline that would occur immediately after digging and transplanting, that would cause a slow but noticeable decline in otherwise healthy palms.
4. No maintenance was scheduled other than pruning. This is often consistent with a site manager overlooking other common palm needs such as supplemental irrigation.

Test your expertise again! Evaluate **PSI Case No. 2 on page 30**

iTree continued from page 1

i-Tree's 2 models ECO and STREETS can assess: public and private tree structure, energy savings from tree shade, air pollution and carbon dioxide removal, compensatory value, and more recently stormwater interception for all public and private trees in a community, neighborhoods, land uses or an entire urban area. The information provided by i-Tree can in turn be used to develop more effective urban forest management and arboricultural practices. (http://www.itreetools.org/eco/ , http://www.itreetools.org/streets/index.php)

In this following article we present findings from some recent studies from the southeastern US that can be used to evaluate i-Tree ECO's methods and results for use in its subtropical climates and ecosystems. We then provide some insights on some sources of sampling and carbon storage estimation errors in i-Tree's ECO model. We also make recommendations and suggestions for improving its accuracy.

The standard ECO protocol requires over 2 dozen measurements using a recommended 200, tenth acre circular plots for a city since this is the number of plots that can be efficiently measured by a 2 person crew over 14-weeks and produce acceptable standard error of 12% of the tree population (http://www.itreetools.org/eco/). A recent study by Martin and others (2011 and 2013) from Auburn University (AU) in Alabama evaluated this sampling protocol. They inventoried 100% of all trees on the managed areas of AU's campus. The measured total tree population numbers were then compared to estimates obtained using the standard ECO protocol. They found that to attain a total tree population estimate for AU's campus with a 10% error, 258 plots were needed, compared to the 200 plots recommended by ECO. However, the current ECO protocol substantially underestimated the amount of necessary plots needed to obtain an acceptable error. They found that 622 plots would be needed for air pollution removal, 870 plots for carbon storage and 483 plots for carbon sequestration.

The ECO model also uses the tree sampling data along with tree size to carbon equations (mostly from forest grown trees outside the southeast) and several tree growth, site, and condition assumptions to estimate carbon storage and sequestration (http://www.itreetools.org/eco/). A recent study by Timilsina and others (2013), measured, felled and weighed the leaves, branches, and aboveground stems for 9 urban live oaks and 8 urban laurel oaks from the University of Florida (UF) campus. The UF data was used to measure biomass and carbon for these trees and to develop an urban oak carbon stem diameter to carbon storage equation. The UF researchers then compared the carbon storage for these 17 urban oaks to estimates from the ECO model and found that ECO consistently underestimated carbon storage by 15% on average. The largest differences, as a percentage of actual tree biomass, were in smaller and medium sized trees, and more than half of the trees were underestimated by at least 20%. A separate analysis compared carbon storage in these 17 oak trees to estimates provided by the USDA Forest Service's Tree Carbon Calculator (CTCC; http://www.fs.fed.us/ccrc/tools/ctcc.shtml) and found that CTCC overestimated by 2% on average. In cities such as Gainesville, Florida where these types of oaks account for much of the tree population and carbon storage, this is an important source of error when making carbon storage and sequestration estimates.

To assess this error when making city-level estimates, the 2013 study by Timilsina and others also measured city-wide urban tree carbon storage changes, or gross C sequestration, for different land uses using data from re-measurements of trees in permanent tenth acre plots and the UF urban oak tree and pine equations from Florida and Alabama. Individual trees were measured for C storage changes over 3 years and the local/regional urban oak and pine equations accounted for 50% of all trees sampled. Preliminary results show that annual gross carbon sequestration using actual measurements, growth rates, and local-regional equations was twice as much as estimated from a study by Escobedo and others (2010) using i-Tree ECO. While a larger sample size is needed, this is an example of inaccuracy which might have a notable impact on a city's overall carbon estimates, depending on species composition and climate.

Since the results reported are from just 2 case studies in Alabama and Florida that used: a 100% inventory for AU's campus, permanently accessible plots, and local-regional equations; efforts show that validating these findings at sites

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datos de inventario de arbolado urbano estandarizado en segmentos de calles o de muestreo aleatorio de parcelas ubicadas en toda la ciudad, los dos modelos de i-Tree ECO y STREET (CALLES) pueden evaluar el arbolado público y privado y el ahorro de energía debida a su sombra, la remoción de contaminación del aire, la captación del dióxido de carbono, el valor compensatorio de todos los árboles en una comunidad o sus sectores o por uso de la tierra. La información proporcionada por i-Tree puede ser utilizada para desarrollar un mejor manejo en las zonas urbanas de manera más eficiente así como para mejorar las prácticas de arboricultura (http://www.itreetools.org/eco/), y http://www.itreetools.org/streets/index.php).

En este artículo presentamos algunos resultados recientes de estudios realizados en el sureste de Estados Unidos (EEUU) que pueden ser utilizados para evaluar la metodología y estimados de ECO para su uso en climas y ecosistemas subtropicales. Luego ofrecemos ejemplos sobre fuentes de errores del muestreo y en las estimaciones de almacenamiento de carbono. También damos unas recomendaciones y sugerencias para mejorar las estimaciones.

El protocolo de ECO requiere más de una docena de mediciones y recomienda utilizar 200 parcelas de un décimo de acre para una ciudad, ya que este es el número de parcelas que 2 personas pueden medir en14-semanas y producir un error estándar aceptable del 12% de la población de árboles (http://www.itreetools.org/eco/). Un estudio reciente de Martin y otros (2011 y 2013) de Auburn University (AU) en Alabama evaluó este protocolo de muestreo. Ellos inventariaron el 100% de los árboles en AU. Luego la medida del número total de la población de árboles fue comparada con las estimaciones obtenidas utilizando ECO. Ellos encontraron que para obtener una estimación de la población total del arbolado del campus de la UA con un 10% de error, 258 parcelas son necesarias en comparación con las 200 parcelas recomendadas por ECO. El actual protocolo subestima considerablemente la cantidad necesaria de parcelas para obtener un error aceptable. Encontraron que 622 parcelas son necesarias para estimar la contaminación del aire, 870 parcelas para el almacenamiento de carbono y 483 parcelas para el secuestro de carbono.

El modelo ECO también utiliza los datos de muestreo y ecuaciones que relacionan el tamaño de árbol son su almacenamiento de carbono (en su mayoría estas ecuaciones fueron desarrolladas en áreas fuera del sureste de EEUU) así como varios supuestos para estimar almacenamiento y secuestro de carbono (http://www.itreetools.org/eco/). Un estudio reciente fue realizado por Timilsina y otros (2013), en el que se midió, talo y peso las hojas, ramas y tallos de 9 Live Oaks y 8 Laurel Oak ubicados en el Campus de la Universidad de Florida (UF). El estudio de UF fue utilizado para medir la biomasa y carbono de estos árboles y poder así desarrollar ecuaciones relacionando el diámetro de tallo y el almacenamiento de carbono. Los investigadores de UF compararon el almacenamiento de carbono para los 17 árboles con los resultados de ECO y encontraron que el modelo subestima el almacenamiento de carbono en un 15% en promedio. Las diferencias más grande fueron en los arboles medianos y pequeño y más de la mitad de los árboles se habían subestimado en al menos 20%. Un análisis por separado comparando el almacenamiento de carbono en estos 17 árboles con las estimaciones proporcionadas por la calculadora de carbono de árbol (CTCC) del Servicio Forestal de EEUU encontró que CTCC sobreestima el valor en un 2% en promedio. En ciudades como Gainesville, Florida, donde estos tipos de árboles forman gran parte de la población de árboles y almacenamiento de carbono, este error puede ser importante a tomarlo en consideración.

Para evaluar este error al hacer estimaciones a nivel de ciudad, Timilsina y otros (2013) midieron cambios en el almacenamiento de carbono, o carbono bruto medido en toda la ciudad, bajo diferentes usos de la tierra utilizando datos de remediciones de parcelas de un decimo de acre y las ecuaciones para arboles urbanos de UF y otras regionales de Florida y Alabama. En los árboles individuales se midieron los cambios de almacenamiento de carbono a lo largo de 3 años. Estas ecuaciones locales y regionales para pino y oak representaron el 50% de todos los árboles muestreados. Los resultados preliminares muestran que mediante las mediciones reales la secuestración bruta anual de carbono y las tasas de crecimiento resultaron en el doble comparado con las estimaciones hechas en un estudio por Escobedo y

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throughout the southern United States are needed to better improve i-Tree estimates. Some of these efforts could include: Developing guidelines for more accurate and efficient data collection methods, determining an optimal number/size of plots for different cities and climates, and incorporating more local-regional and species/site-specific leaf area and biomass equations and model assumptions necessary for estimating urban forest ecosystem services.

This additional information is important since the amount of time and cost associated with acquiring i-Tree data is directly dependent on measurement effort and the number and size of plots. Site and species-specific carbon sequestration estimates, for example, are also important for participation in carbon markets and verifying and monitoring existing and future carbon offset account protocols: http://www.climateactionreserve.org/wp-content/uploads/2009/03/Urban_Forest_Protocol_summary_0309.pdf. Finally real world examples and guidelines of how cities have used i-Tree results for promoting and advocating for their urban forest resources would also benefit users.

In conclusion, developed over a decade ago from several different models and studies, mostly from the temperate Northeastern, Midwestern and Pacific Coast areas of the US, i-Tree is now beginning to be widely used in cities across the southern US and other countries. We hope that studies such as these are useful to both i-Tree users and developers in further advancing – and improving- this tool. In addition to the i-Tree Resources web site: http://www.itreetools.org/resources/ ; the following readings will provide more information on the studies presented in this article:

- Escobedo, F, Varela S, Zhao, M, Wagner J, Zipperer W. 2010. Analyzing the efficacy of subtropical urban forests in offsetting carbon emissions from cities. Environmental Science & Policy, 13:362-372.
- Martin, N.A., A.H. Chappelka, G. J. Keever, and E.F. Loewenstein. 2011. A 100% tree inventory using i-Tree Eco protocol: A case study at Auburn University, Alabama. Arboriculture & Urban Forestry 37: 207-212.
- Martin, N.A., A.H. Chappelka, E.F. Loewenstein G.J. Keever and G. Somers. 2013. Evaluation of sampling protocol for i-tree Eco: A care study in predicting ecosystem services at Auburn University, Alabama. Arboriculture.& Urban Forestry 39:56-61.
- Timilsina, N., Staudhammer, C.L., Escobedo, F.J., Lawrence, A. 2013. Tree wood waste biomass yield and carbon storage changes in an urban forest. Publication currently under review.❖

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otros (2010) usando el modelo ECO. Un tamaño de muestreo mayor es necesario pero, esto es un ejemplo de la inexactitud que puede tener un impacto importante en una ciudad al estimar el nivel de carbono, según la composición de las especies.

Puesto que los resultados publicados son solo de 2 estudios en Alabama y Florida que: usaron un inventario del 100% en el campus de AU, parcelas permanentes y accesibles, ecuaciones locales y regionales; muestran que es necesario validar estos resultados en otros sitios a través de toda la parte sur de EEUU para así mejorar las estimaciones de i-Tree. Algunos de estas necesidades son: Desarrollo de lineamientos para mejorar y hacer más eficiente la recolección de datos, determinar el número y tamaños óptimo de las parcelas en diferentes tipos de climas y ciudades, e incorporar más ecuaciones biométricas así como suposiciones especificas a lugares y especies para predecir los servicios ecosistémicos del arbolado urbano.

Esta información adicional es importante ya que la cantidad del tiempo y los costos asociados con la adquisición de datos para i-Tree depende directamente de número de parcela y de su tamaño. Estimaciones más precisas y específicas a lugares y especies son también importantes para poder participar en programas para pagos por servicios ambientales y verificación y monitoreo para programas de reducción de gases de efecto invernadero: http://www.climateactionreserve.org/wp-content/uploads/2009/03/Urban_Forest_Protocol_summary_0309.pdf.

En conclusión, desarrollado desde hace más de una década de varios modelos y diferentes estudios realizados de la Región Noreste, Centro-oeste y las zonas de la Costa del Pacífico de USA, i-Tree está siendo utilizado en ciudades a lo largo del sureste de USA y en otros países. Creemos que estudios de este tipo pueden ayudar a los usuarios y desarrolladores de i-Tree para el avance y mejoramiento de esta herramienta. En adición a la página Web de i-Tree: http://www.itreetools.org/resources/ ; estas otras publicaciones proveen más información sobre los estudios presentados en este artículo:

- Escobedo, F, Varela S, Zhao, M, Wagner J, Zipperer W. 2010. Analyzing the efficacy of subtropical urban forests in offsetting carbon emissions from cities. Environmental Science & Policy, 13:362-372.

- Martin, N.A., A.H. Chappelka, G. J. Keever, and E.F. Loewenstein. 2011. A 100% tree inventory using i-Tree Eco protocol: A case study at Auburn University, Alabama. Arboriculture & Urban Forestry 37: 207-212.

- Martin, N.A., A.H. Chappelka, E.F. Loewenstein G.J. Keever and G. Somers. 2013. Evaluation of sampling protocol for i-tree Eco: A care study in predicting ecosystem services at Auburn University, Alabama. Arboriculture.& Urban Forestry 39:56-61.

- Timilsina, N., Staudhammer, C.L., Escobedo, F.J., Lawrence, A. 2013. Tree wood waste biomass yield and carbon storage changes in an urban forest. Publication currently under review.❖

Tree and Human Health May Be Linked

USDA Forest Service
Pacific Northwest Research Station

Evidence is increasing from multiple scientific fields that exposure to the natural environment can improve human health. In a new study by the U.S. Forest Service, the presence of trees was associated with human health.

For Geoffrey Donovan, a research forester at the Forest Service's Pacific Northwest Research Station, and his colleagues, the loss of 100 million trees in the eastern and Midwestern United States was an unprecedented opportunity to study the impact of a major change in the natural environment on human health.

A tree-lined street in Toledo, Ohio in 2006, before emerald ash borer infestation. Credit: Dan Herms, Ohio State University.

In an analysis of 18 years of data from 1,296 counties in 15 states, researchers found that Americans living in areas infested by the emerald ash borer, a beetle that kills ash trees, suffered from an additional 15,000 deaths from cardiovascular disease and 6,000 more deaths from lower respiratory disease when compared to uninfected areas. When emerald ash borer comes into a community, city streets lined with ash trees become treeless.

The researchers analyzed demographic, human mortality, and forest health data at the county level between 1990 and 2007. The data came from counties in states with at least one confirmed case of the emerald ash borer in 2010. The findings—which hold true after accounting for the influence of demographic differences, like income, race, and education—are published in the current issue of the American Journal of Preventive Medicine.

" There's a natural tendency to see our findings and conclude that, surely, the higher mortality rates are because of some confounding variable, like income or education, and not the loss of trees," said Donovan. "But we saw the same pattern repeated over and over in counties with very different demographic makeups."

Although the study shows the association between loss of trees and human mortality from cardiovascular and lower respiratory disease, it did not prove a causal link. The reason for the association is yet to be determined.

The emerald ash borer was first discovered near Detroit, Michigan, in 2002. The borer attacks all 22 species of North American ash and kills virtually all of the trees it infests.

The study was conducted in collaboration with David Butry, with the National Institute of Standards and Technology; Yvonne Michael, with Drexel University; and Jeffrey Prestemon, Andrew Liebhold, Demetrios Gatziolis, and Megan Mao, with the Forest Service's Southern, Northern, and Pacific Northwest Research Stations.❖

Three years later, in 2009, after the invasive insect spread to the neighborhood. Credit: Dan Herms, Ohio State University.

Save Money by Extending the Life of Your Bucket, Boom and Grapple Trucks

Dan Jenkins

Most managers and owners of Tree Industry Operations agree that changes in the economy over the last five years have resulted in the need to become more efficient in terms of equipment utilization and maintenance with fewer dollars than ever before. It's no longer financially realistic to simply trade in a boom, bucket or grapple truck on a new one when the old one begins to show significant wear.

What hasn't changed in the industry is the need for operators to work the equipment to its maximum on a continual basis and indeed to the point of abusing and overextending its capabilities. An industry professional was recently quoted as saying "it's more likely that you'll find "Big Foot" eating at McDonalds than to find a boom operator who can feather a load".

Successful tree companies must learn not only to do a better job of preventive maintenance on their equipment than ever before but more importantly to understand that equipment refurbishment can do wonders for their budgets and long term cash flow.

Extending the life of heavy equipment has always been a recurring topic in this industry. We hope the information below may prove helpful in making better decisions regarding the "scrapping", trading, replacing or refurbishing of the equipment.

When is the best time to perform an equipment overhaul?

Depending on the extent of and intensity of usage and quality of the preventative maintenance program, booms, buckets and grapple trucks start seeing significant hydraulic cylinder and plumbing leakage and bypassing, controls malfunctions, weldment cracking and excessive "play" in bearings, bushings and pin connections in the 6-10 year time frame.

How deep into the piece of equipment do refurbishers typically go?

For arborists, two classifications pertain:

1) Refurbish or rebuild components: Perhaps the Rotex gear assembly is still nice and tight but the boom is showing a good deal of "play" on extend or foldout and perhaps a couple hydraulic fluid leaks are apparent. The important consideration here is to ensure the machine, although perhaps not perfect, is structurally sound and safe to operate. Handling those items that are not structurally sound nor safe is the obvious way to prioritize repairs.
2) Remanufacture (like new): If everything on the crane is flopping around and/or most fittings and cylinders are bypassing or leaking this alternative is one worthy of consideration.
    a. Normally a boom truck crane, aerial lift bucket or grapple crane can be disassembled completely with every hydraulic cylinder honed and resealed, every hose and fitting replaced, every control valve replaced or resealed, every pin and bushing replaced and/or journal welded and align bored, every slider pad replaced new and the electrical system replaced for 40% to 50% of a new machine.
    b. When/if you have to replace the Rotex gear and rebuild the swing gear drive, then those costs usually go up to 60% or so.
    c. This results not necessarily in a pretty, new machine but one which will serve you reliably and safely for another 5+ years.

What are some major components that can be refurbished and what are some of the most common issues and repairs found in the tree industry?

1) Booms: Due to the nature of the business, bucket and grapple truck operators are notorious for overloading, side loading and striking objects. Common repairs to fix problems include straightening, repairing cracks, replacing/refurbishing pins and journals and replacing slider pads
2) Hydraulics: Common problems that lead to repairs include overuse that leads to excessive wear, debris that

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is not cleaned off the cylinders and abuse. Common repairs to fix problems include replacing or rebuilding gear boxes, valves, hoses and rotation bearings.

3) Outriggers: Common problems include damage from improper set-up, not fully extending, poor ground conditions and not leveling the truck/crane. Common repairs to fix problems include hydraulic repairs, straightening, welding and replacing slider pads.

4) Electrical: Common problems stem from the environment, overloading equipment and unqualified mechanics taking short cuts. Common repairs to fix problems include replacing electrical components back to original which includes wiring harnesses and **restraining unqualified mechanics from performing electrical wiring!!**

5) Cabs and Roll Over Protection Systems: Common problems include cracked windows, gauges not functioning and floorboards rusting. Common repairs to fix problems include cab restoration which include painting.

6) Buckets and Baskets: Common problems include excessive abuse which causes chips, cracks and damage to electronics, controls, guardrails and leveling cables. Common repairs to fix problems are to rebuild, repair and replace components.

A tree company can expect a 40-50% savings off the purchase of new equipment, depending on the type and condition of the machine. The typical time frame to refurbish a single bucket truck or grapple truck is roughly 60-90 days. Many tree companies are concerned about recurring problems after major repairs and wonder what typical industry warranties are; warranties on parts are set by the manufacturer while the warranty on the labor is provided by the company doing the equipment re-building.

If considering refurbishing, do your homework!

Make sure whoever refurbishes the equipment is able to provide documentation of welding procedures used for all boom repair and structural repairs, and documentation that all welders are certified under the American Welding Society. They should also be able to provide documentation of a Load Test – a test to determine a specific load for which a crane or hoist is designed. This test includes checking cylinders, valves, seals & fittings, excessive boom deflection, winch operation and load line fraying.

In conclusion, with demands to keep operating budgets and capital purchases low, tree companies are have a dilemma when it comes to replacing aging equipment. Regardless, at the end of the day tree companies must supply their workforce compliant and properly functioning bucket and grapple trucks to perform duties safely and in a timely manner. This is particularly true during emergency situations, both natural and manmade. If replacing new equipment every 5 years is not within reach of your budget, one option to consider is refurbishing the fleet of bucket and grapple trucks based on needs and condition of equipment.

Certified Boom Repair Services, Inc., Tampa, FL

Business Groups Offer Affordable Care Act Webinars

Small business owners can learn the basics of the Affordable Care Act and how it affects them.

The Small Business Administration and Small Business Majority are offering small business owners Affordable Care Act 101 webinars.

Each Thursday from Aug. 15 to Sept. 26 (with the exception of Aug. 29), small business owners can learn the basics of the Affordable Care Act and what it means for their company and employees, including insurance reforms, the small business health care tax credit, the new health insurance marketplaces and employer shared responsibility provisions. SBA representatives help small business owners understand the facts of the Affordable Care Act so they can make informed decisions about providing health insurance for their employees.

To register for one of the upcoming webinars, visit the SBA website. For more information about the Affordable Care Act, click here.

Florida e-Tree News

The Florida e-Tree News is a free monthly e-letter sent out by the Florida Chapter ISA. It is intended to inform arborists, tree care workers, landscape architects and other green industry professionals of up-to-date arboriculture information in the state of Florida.
www.floridaisa.org

Shell-wall thickness and breaking safety of mature trees

Frank Rinn

Abstract: The acceptable level of trunk hollowness with regard to the breaking safety of trees has been debated for decades but remains unresolved for most tree experts because of contradictory statements, theories, and publications. However, research and observations clearly demonstrate that mature (large diameter) trees require much less remaining shell-wall thickness for reasonable stability, than younger trees still growing in height. Furthermore, stability of mature trees is surprisingly independent of wood material properties such as fiber strength.

Keywords: shell-wall thickness, one-third-rule, breaking safety, tree safety

Introduction

Storm events often lead to breakage of conifer trees in forest stands, even those with intact cross sections. Breakage, though, is probably more likely to occur if decay is present. (**Fig. 1**). On the other hand, old trees are known for having surprisingly thin shell-walls, often for many decades (**Fig. 2**), yet many survive even strong storm events — even trees that are quite tall or have large, wide-spreading crowns. These observations seem contradictory, but can be explained as subsequently shown.

The uncertainty about potential stem breakage safety was one of the reasons for developing mobile testing methods to detect internal decay, and for measuring shell-wall thickness. In 1984, two retired German engineers (Kamm & Voss) tested a drilling device using a spring-driven scratch pin, and which recorded a 1:1-scaled profile of the thin needle's penetration resistance on a wax paper strip within the machine. These profiles allowed for the detection of large voids in trees, but were found to be systematically wrong in the more intact portion of the stem because of resonance and damping effects of the spring-loaded recording mechanism. Thus, evaluations of utility poles, trees, and timber products based on such profiles were also systematically wrong and unreliable. For example, decay was identified were the wood was just soft (by nature), but intact. Consequently, Kamm & Voss developed a resistance drill that recorded data electrically. With that improvement, they then tried to sell the corresponding patent application (Kamm & Voss 1985). A company interested in the intellectual property asked a German University whether the concept, based on measuring needle-penetration resistance, was practical. Starting in 1986, this idea became the subject of a physics graduate research thesis (Rinn 1988). This research resulted in further technical developments and finally, patent applications describing high-resolution machines and drilling needles (Rinn 1990, 1991). The results clearly showed that regulation of the machine, acquisition of measurement values and recording of the profiles must be done electronically to ensure a distinct (linear) correlation between the obtained profiles and wood density — the major wood material property (Rinn et.al. 1989 & 1996). Only those profiles obtained in this manner, enable the user to correctly interpret results and reliably evaluate wood condition (Rinn

How hollow can a mature tree become, before the risk of stem breakage is unacceptable?

Figure 1. In forest stands, internally decayed stems show a significantly higher breaking probability, but even completely intact cross sections may break.

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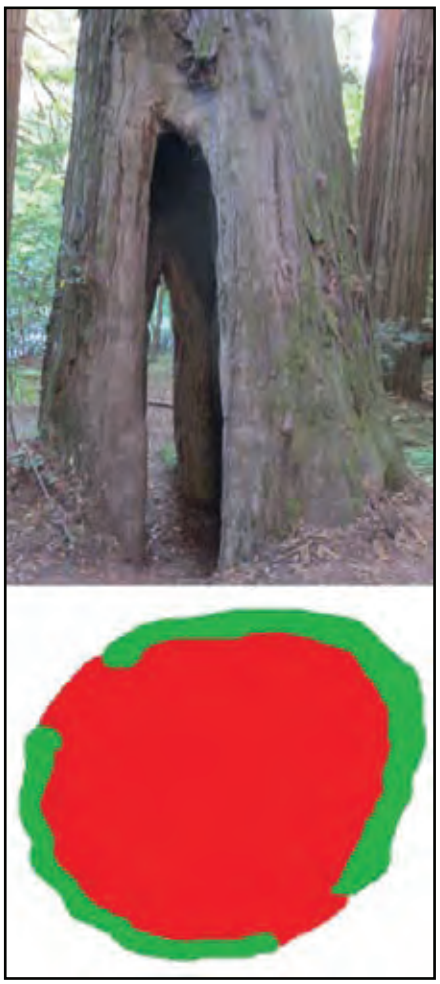


Figure 2. Large, old trees with very thin shell walls (t/R<1/5) often remain standing for decades despite the loss of much of their stem cross sections.

1996). Thereafter, wood samples from all over the world were tested with these improved devices. It's interesting to note that in stems of coconut palms (**Fig. 3**) it was found that approximately ⅓ of the trunk radius has a significantly higher density (and strength).

Some years later, Mattheck and Breloer published statistical data (1994) claiming that breaking safety of tree trunks is significantly lowered if the remaining intact outer shell wall (t) is thinner than ⅓ the radius (R). This finding was interpreted as confirmation of a potential natural mechanical design because the mechanical load characteristics of coconut palms are similar to slender conifers in forest stands.

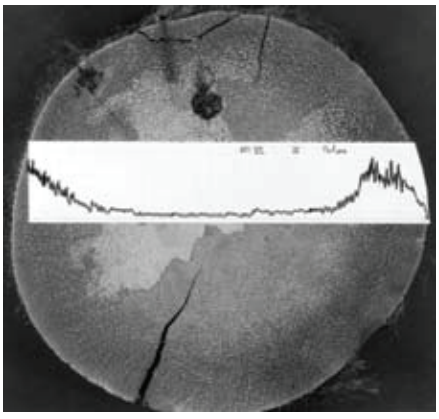
Eventually, new analytical and computational methods suggested that tangential tension stresses as a consequence of bending or torsional loads may explain the increase of breaking failures of trees with a t/R< ⅓ (Ledermann 2003). This result was expected because torsional and shear strength of wood are comparatively low (Blass und Schmidt 1998).

Years later, critics claimed that there is no scientific proof of the so-called 'Mattheck's ⅓ -rule' (Gruber 2007, 2008), and thus, no valid reason to fell trees if t/R< ⅓. Consequently, practitioners and experts became increasingly unsure about which method or 'rule' to apply for safety evaluation of trees.

Trunk and crown relations

The mechanical bending load of upright tree trunks is mainly determined by wind load (Spatz & Bruechert 2000). Because wind speed tends to increase with height above ground, and drag is dependent on wind speed to the power of two, tree height is the dominating allometric wind-load factor. Consequently, after a tree has reached maximum height, wind load does not increase any more (White 1998), although old branches may locally face higher drag due to higher wood stiffness (Fratzl 2002). While the crown does not grow any more, girth usually continues to increase due to annual radial growth increments. That means the trunks of aging trees continuously gain load-carrying capacity, while the load remains fairly constant. Consequently, the increasing girth of aging trees automatically leads to a steady increase in the trunk breakage safety factor (= load-carrying capacity / load). And this leads to the question: How hollow can a mature tree become, before the risk of stem breakage is unacceptable?

Figure 3. A resistance drilling profile of a coconut palm stem disk showing linear correlation to wood density, and that approximately ⅓ of the outer radius has significantly higher wood density.



Numerical estimation (based on Gere and Timoshenko 1997)

Mechanical stress (**S**) in a cross section is usually defined as the acting force (**F**) divided by the area (**A**):

$$S = F / A$$

If a bending moment (**M**) is applied, stress can be calculated from

$$S = M / W$$

W characterizes the section modulus that is usually determined by an integral over the cross sectional area. For cylinders of diameter (**D**) and a central void of diameter (**d**), **W** can be calculated in a simple form:

$$W = \pi * (D^4 - d^4)/(32*D)$$

Strain in the material is usually defined by changes in length (ΔL) divided by the observed distance (**L**):

$$\varepsilon = \Delta L / L$$

At the same time, strain is a consequence of external loading and strongly determined by the modulus of elasticity (**E**):

$$\varepsilon = \Delta L / L = S / E$$

This helps to explain the influence of material strength (= maximum applicable stress = S_{max}) on the maximum bending load that can be applied without causing damage:

$$M_{max} = W * S_{max}$$

In an intact cylindrical cross section (**d=0**), the dependence of the load carrying capacity on diameter and material strength is obvious:

$$M_{max} \sim D^3 \ S_{max}$$

Therefore, a doubling of the material strength value of the wood (S_{max}) in the whole cross-section leads to a double maximum applicable bending load (M_{max}). A doubling of trunk

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diameter, however, leads to an eight-fold increase in maximum applicable bending load:

$(2*D)^3 = 8*D^3$

Compared to the impact of diameter increase on total load carrying capacity, higher material strength within a newly formed tree ring is only of marginal relevance. The influence of radial growth of a stem cross section in terms of dimension is thus, far more important than changes in material properties. Therefore, we can characterize the load-carrying capacity of cylindrical cross sections in first order by its diameter.

Diameter growth with age

As already shown by Bräker (1981), ring width of mature trees usually stabilizes as a nearly constant value. If we assume that ring width, after the tree has reached maximum crown height (**time point y=0**), is a percentage (**p**) of the diameter at this time ($\mathbf{D_1}$), we can estimate later diameters ($\mathbf{D_2}$), years (**y**) after D_1 was reached:

$$\mathbf{D_2 = (1 + y * p) * D_1}$$

The corresponding section modulus can then be written as:

$$W_2 = \pi * \frac{(D_2^4 - d_2^4)}{(32 * D_2)} = \pi * \frac{((1 + y * p)^4 * D_1^4 - d_2^4)}{(32 * (1 + y * p) * D_1)}$$

Now we can ask the most important question: at what point (level of hollowness) does a large old tree become unstable? For easier evaluation we transform diameter values into shell-wall thickness (**t**) and stem radius (**R**):

t/R = 1 – d/D

Once we set $W_2! = W_1$, we can calculate t/R-ratios equivalent to the ones at y=0:

$$\frac{t_2}{R_2} = 1 - \sqrt[4]{1 - \frac{(1 - (1 - \frac{t_1}{R_1})^4)}{(1 + y * p)^3}}$$

With this formula we can determine the t_2/R_2-ratio at any given point in time of maturity (y>0), which is equivalent to a certain t_1/R_1-value at y=0.

Practical application

If we assume an intact (**d_1= 0**) tree trunk has a diameter of D_1= 60cm (about 24 inches) at the time when its crown reaches its maximum height (**y=0**), and then an annual ring width of 3mm (**p = 0.5% of D_1**), the diameter of the trunk after y = 20 years will be D_2 = 66cm. If this trunk cross section then (at y = 20) would have a central void of d_2 = 47cm, it would have the same load-carrying capacity as the completely intact cross section at y=0 (**Fig. 4**) That means, if we assume the tree at y=0 is "absolutely safe in bending" (because it is completely intact), we have to grant the same level of safety 20 years later to this tree with a diameter of 66cm if there is a central void leading to a t/R ratio less then ⅓: $t_2/R_2 = 9.5/33 \approx 0.29$, because these two cross-sections provide the same load-carrying capacity and thus, similar breaking safety.

If we assume a cylindrical trunk (D_1= 60cm) has a central void of d_1= 40 at y=0 (that means a t/R= ⅓), after y = 20 years and p = 0.5%, D_2 would be 66cm. If this trunk then has a central void of d_2= 52 (=>$t_2/R_2 \approx 1/5$), it would provide the same load carrying capacity as with a t_1/R_1= ⅓ at y=0 (**Fig 5**). What this means in terms of bending safety for such trees is that: a t/R= 1/5 at y = 20 is equivalent to a t/R= ⅓ about 20 years earlier (y=0). If we believe a t/R= ⅓ is a measure representing sufficient 'stability' of a tree at y=0, then we have to accept, that 20 years later, a t/R= 1/5 represents the same amount of 'stability' and relative safety.

Consequently, the critical t/R ratio is not a constant value, but strongly depends on trunk diameter and thus age (and crown size), as soon as the height does not increase any more.

Consequences and limits

Especially in the urban landscape, risk of tree failures, resulting in injury to people or property damage, resulting from tree failures, increases with age. Therefore, most trees that require a thorough assessment are more or less mature. Consequently, the approach described here is relevant for the majority of urban tree inspections, especially for level 2 and 3 as defined and explained by the ISA tree risk assessment qualification (TRAQ).

The comparative shell-wall safety estimation method as described above, shows that the so-called '⅓-rule' may be correct for a certain kind and age class of trunks, but has no relevance for mature trees, and should not be used to justify felling or even extensive crown reduction to mitigate risk for such trees. In mature trees, a t/R= ⅓ is not even the starting point for being concerned about breaking safety, because, as shown above, in terms of breaking safety, a t/R= 1/5 or even less can be equivalent to a t/R= ⅓ at the time the tree reached maximum crown height. This explains why large, old, hollow trees with very thin shell walls often stand for decades, despite large crowns and exposure to strong wind.

When we assume the ⅓-rule as being correct in describing the point where the probability of breaking failures starts increasing significantly for centrally decayed, thin, and tall, slender forest trees (and coconut palms), we have to accept that this starting point for concern shifts down to thinner shell walls once maximum height growth is reached, because tree diameter continues to increase. In the second example described above, the starting point for concern would be a t/R= 1/5 (assuming that a t/R= ⅓ is the starting point of concern for younger trees as described above).

However, it has to be taken into account that this approach as presented here is valid only as long as t/R>1/10, approximately. Below this 'limit', and if big, open cavities are present, more complex approaches and estimations

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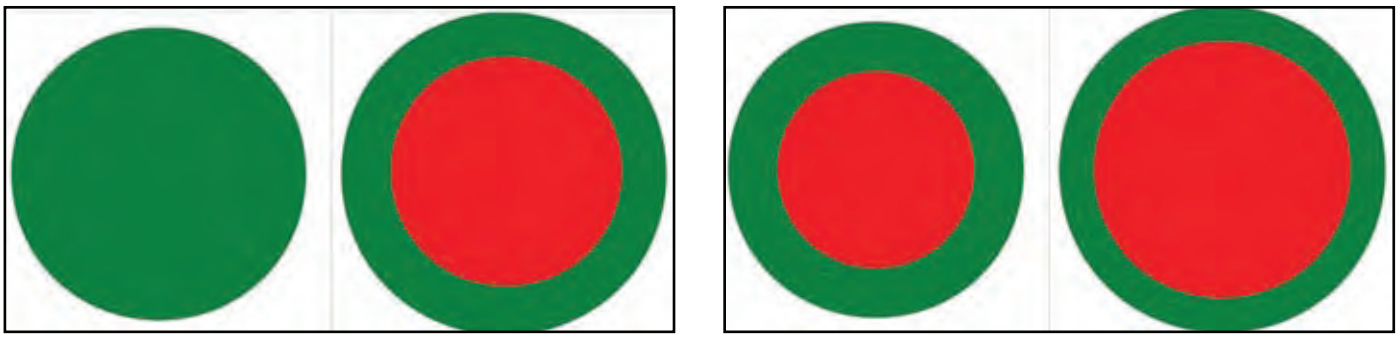

Figure 4. (Left) These two cross-sections (sketch to scale) provide the same load-carrying capacity and thus the same breaking safety provided the same wind load is applied.

Figure 5. (Right) The left cross section of a decayed tree stem at year=0 provides a t/R≈⅓. The image on the far right shows the same cross section after 20 years of annual increment growth and further decay progression with a t/R≈$^{1}/_{5}$. Assuming the same wind load, these two cross sections (sketch made to scale) provide approximately the same load-carrying capacity, therefore, if an expert evaluates the left cross section as acceptable ('safe enough') at the time of inspection (y=0), the same grade of safety has to be granted to the tree 20 years later despite a thinner shell wall.

have to be applied, because other failure modes may occur, and because longitudinal dimension of wood deterioration or other structural damages become more important (Niklas and Spatz 2012; 2013). This aspect shall be explained in future publications.

In addition, in terms of loss of load-carrying capacity (LCC), the location of decay (centered or uncentered) within the cross section, as well as cross-sectional shape, are more important than just the size of deteriorated parts (Rinn 2011). Comparatively small areas of decay in the outer sapwood of the stem, or on the upper side of a horizontal branch can lead to significantly greater losses of LCC and thus, have a greater impact on safety than large centrally located voids. Consequently, for assessing the stem breaking safety of mature trees, it is not enough to determine shell wall thickness by, for example, resistance drilling at just one point, or measuring fiber strain with only one elongation sensor during one pull-test. Both results are valid only for the point of measurement and cannot be extrapolated to the whole trunk. Results can be quite different in other areas of the same cross section, and even more so, up and down the trunk. If devices that can be calibrated are properly applied, both measurement methods (resistance drilling and pull test strain-assessment) can deliver valuable information, and significantly enhance tree risk evaluation compared to visual grading alone. But it has to be taken into account that each result is only valid for the point of measurement. In this sense, tomographic approaches deliver more information, but still have to be understood and interpreted correctly. (**Fig. 6**)

Without knowing the weakest point of the tree trunk under external loading, every localized measurement is just an approximation and cannot describe the mechanical behavior of the whole cross section, trunk or even tree. This limitation is valid for all technical methods and devices in a specific certain way, and has to be clearly understood, explained and communicated by the experts.

The shell-wall-to-radius-ratio (t/R) required for sufficient breaking safety is not a constant value over time, but decreases as trees mature

Figure 6. Two examples of decayed trunk cross sections of mature urban trees (left: *Ulmus*, right: *Tilia*). Decay columns are often asymmetric because they develop from trunk wounds or damaged roots. In addition, many mature urban trees do not have cylindrical cross sections. Thus, simple measurements of shell-wall-to-radius-ratios, or the local assessment of strain by pull-tests can hardly be applied correctly for evaluating breaking safety. In such situations, tomographic assessments are required for obtaining more precise results and more reliable evaluations.

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and increase in girth. Understanding and applying this aspect of natural tree architecture while inspecting and evaluating mature urban trees can prevent unnecessary felling or crown reduction as compared to current standards - for the good of nature, people, and municipal budgets. In this manner, trees can be retained longer to provide social and environmental benefits that enhance quality of life in urban landscapes, without endangering people and their property.

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PSI:
PLANT SCENE INVESTIGATION

PSI Case No. 2

Approximately three months after a landscape contractor installed 15 medjool palms (Phoenix dactylifera 'medjool') on a property under construction in Miami, the site developer observed that the palms appeared to be worsening in health, with notably fewer fronds than typical and even a pronounced droop in the canopy of several of the palms. The palms were installed in tree wells, subsequently surrounded by large pavers and covered with planting grates. The developer was unsure if the palms were in decline due to improper handling, planting or plant quality (and therefore the landscape contractor's responsibility); improper maintenance or irrigation (and therefore the developer's responsibility) or if this decline was a normal phenomenon to be expected as part of the palm's typical planting pattern. The site developer called his consulting arborist to visit the site and review installation photos provided by the landscape contractor, and make a determination. A review of the installation photos showed healthy palms at the nursery, sandy soil used for backfill, a typical number of palm fronds were present at installation and the fronds were tied during and after installation.

What factors did the arborist examine and what was the final diagnosis?

Issue: Decline of recently planted medjool palms

Date: Planted in March, observed in June

Location: Private development site in Miami, FL

Trees affected: Phoenix dactylifera 'medjool' (Medjool palm)

Photo 1
Overview photo, example of medjool palms appearing to be in decline

Photo 2
Example medjool palm canopy: few fronds, starting to lean

Photo 3
Example of tree well with backfill soil visible

Challenge yourself on another case - Evaluate **PSI Case No. 3 on page 32**

PSI Case No. 2 Answer on page 31

PSI Case No.2 continued from page 30

PSI Case No. 2

Answer: The palms had severely undersized root balls on one or more sides. In making this determination, the arborist verified that: the palms all had active irrigation; the soil did not show signs of being overly saturated and the backfill soil was sandy, and then a partial excavation was conducted on a number of root balls, verifying that many had less than four inches of radius beyond the trunk on at least one side. Industry standards require at least 10 and preferably 12 inches of root ball radius for palms of this size. Since the site was being maintained, as palm fronds began to wither and droop, the maintenance company was removing them.

Clues to making this determination:

1. The palms were newly installed, so issues such as nutritional deficiencies likely would not have taken affect.
2. With irrigation in place and a sandy backfill soil, the medjools likely have an acceptable water supply. Medjools are known to suffer in waterlogged soils, but with sandy soil surrounded by pavement, this was unlikely to be the case on this site.
3. No yellowing or other signs of disease are evident from the photos.
4. An undersized root ball is consistent with a decline that would occur immediately after digging and transplanting, in otherwise healthy palms.❖

PSI:
PLANT SCENE INVESTIGATION

PSI Case No. 3

While on a routine inspection in the Florida Keys, Florida Department of Transportation staff notice an issue in the trees alongside the road, adjacent to Long Key State Park. A contiguous brown "line" approximately 10 inches tall by 30 feet long comprised of dead leaves and twigs appeared in the canopies of native upland forest trees bordering US 1. Knowing the ecological sensitivity of the area, they contact the environmental specialist for the project, who gathers the following observations.

What factors did the arborist examine and what was the final diagnosis?

Issue: Approximate 50 foot-long necrotic band on the foliage of a row of trees

Location: East side of US 1 at Mile Marker 67.5, Long Key (adjacent to Long Key State Park).

Date: July, 2013

Trees affected: Conocarpus erectus (green button-wood) and Bursera simaruba (gumbo limbo)

Photo 1
Looking north, just after issue observed

Photo 2
View from Photo 1, taken in 2011

Photo 3
Looking south, issue visible in red circle

Photo 4
View from Photo 3, taken in 2011

Send your diagnosis to Mike McCoy at mmccoy@metriceng.com, to see if you are the first one to answer correctly. Watch for the correct answer in the Winter 2013 issue of the Florida Arborist!

In the News

Plant Talk

Recent research shows that plants are able to send warnings of incoming aphids to other plants connected to their network.

Carried out by researchers from the University of Aberdeen, the James Hutton Institute and Rothamsted Research, the study demonstrated that the plants are able to send warnings of incoming aphids to other plants connected to their network. The plants then send out a chemical signal that repels aphids and attracts wasps, a natural aphid predator.

The research follows previous findings that have shown plants can communicate similar chemical warnings through the air.

The new study says plants can connect with other via a common fungus known as mycorrhizae. "Mycorrhizal fungi need to get [products of photosynthesis] from the plant, and they have to do something for the plant," John Pickett of Rothamsted Research told the BBC.

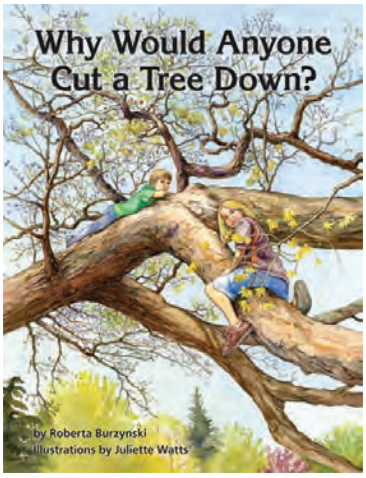
"In the past, we thought of them making nutrients available from the [roots and soil], but now we see another evolutionary role for them in which they pay the plant back by transmitting the signal efficiently," he said.

University of Aberdeen's David Johnson added, "Our understanding of ecological systems has not considered the fact that plants are interconnected in this way. It could have major implications for our understanding of how one organism affects another."

Conversely, the plants in the study not connected to the fungal network did not send out warning signals to other plants after coming under attack. The in-network plants were also covered with bags to ensure that they were not actually sending the signals through the air.

Pickett said the discovery could lead to farms using the fungi as an advance warning system for their crops. In theory, one "sacrificial" plant would be kept at a distance from the crops. If it fell under attack from insects, it would warn the rest of the plants, giving them time to mount a viable defense.
Source: Greenhouse Management

Why Would Anyone Cut A Tree? Down?



Some children and adults are unaware that in order to reduce tree hazards, protect other trees, or to get wood, it is necessary to cut trees.

This book is intended to raise awareness of the issue. It also features tips for planting a tree. *Why Would Anyone Cut a Tree Down?* is a 41-page book published by the U.S. Forest Service Northeastern Area State and Private Forestry. It features 28 full-color, hand-painted illustrations. The book is intended primarily for 1st to 3rd graders, as well as parents and educators. See link to view online. http://na.fs.fed.us/whycutatree/

2013 International Tree Climbing Championship

Dominic Pallotti represented the Florida Chapter in the recent International Tree Climbing Championship held in Toronto, Canada.

Thanks, Dominic, for giving it your all! It's never too soon to gear up for the next Florida Tree Climbing Championship! TCC Chair Adam Jackson is working on plans to hold the 2014 event in February or March in Polk County.

Trees4Florida Public Service Announcements Available at www.treesarecool.com

With the devastation to trees in Florida by hurricanes, storms and fires, millions of dollars in valuable tree resources have been lost, particularly within the past several years. Jointly, the Florida Urban Forestry Council (FUFC) and the Florida Chapter of the International Society of Arboriculture (FC-ISA) developed the Trees-4Florida program which focuses on making the public more aware of the need to be vigilant in safeguarding our trees and preserving Florida's greatest green resource.

The Trees 4 Florida program has produced a variety of Public Service Announcements (PSAs) available for anyone to free of charge. Included in the campaign are English and Spanish print-quality and broadcast-quality PSA ads and spots. Include them on your website, flyers or any promotional material.

Access these FREE PSAs by visiting *www.treesarecool.com*; hover on 'Trees4Florida' in the menu box to the left to make your choice of ad style.

Membership Corner

Celeste White, Vice President Florida Chapter

Have you ever wondered what our Florida Chapter Membership looks like? Who are your fellow members? As of July, Florida has 1,306 ISA members; 161 are members of ISA International only and 18 are Florida Chapter only members, our newest membership category.

Not all of our members are certified arborists – 1,076 members are certified arborists and 230 are not. Some of the certified members also hold specialty designations:

- 9 Board Certified Master Arborists
- 25 Municipal Specialists
- 16 Tree Workers
- 40 Utility Specialists

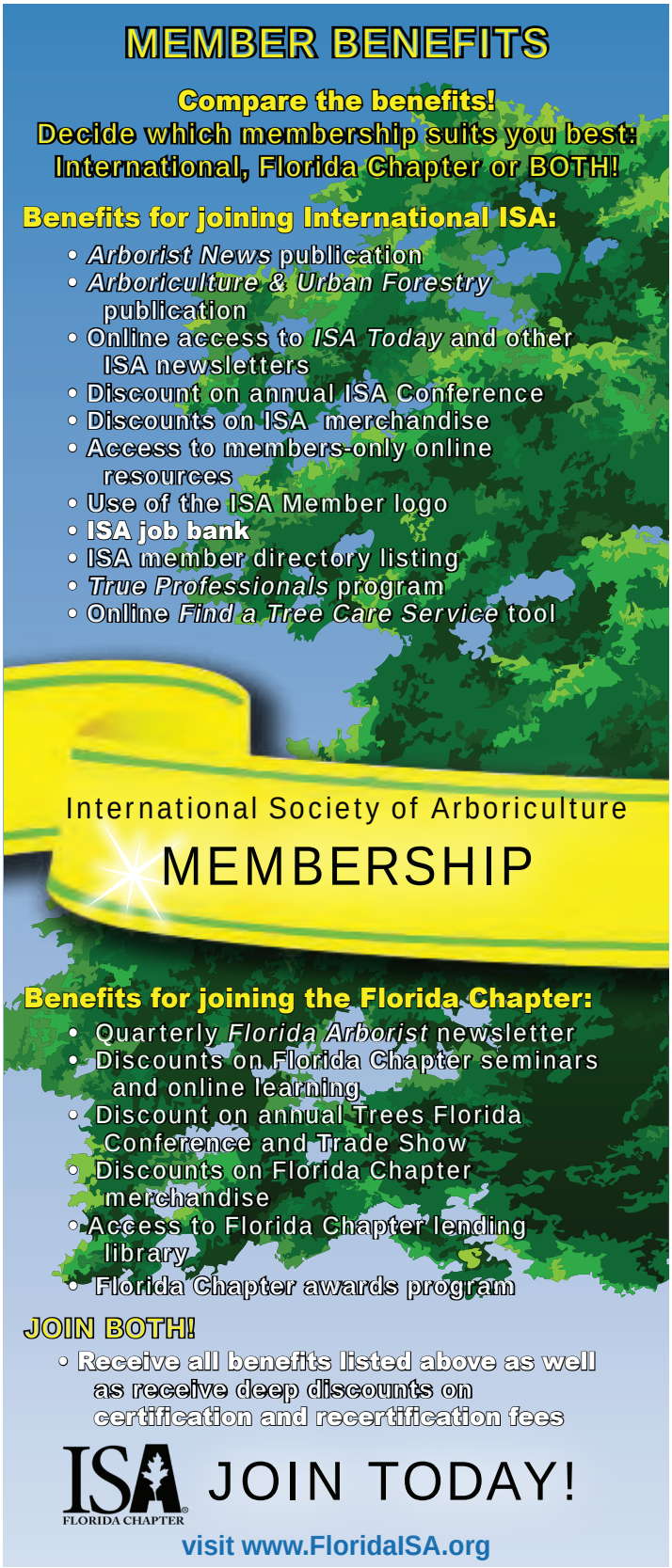
Where in Florida are most of the members? The largest concentration of members and certified arborists are in Pinellas County (215 certified arborists, 145 members), Broward County (212 certified arborists, 128 members), Miami-Dade County (161 certified arborists, 96 members), Palm Beach (119 certified arborists, 92 members) and Hillsborough County (117 certified arborists, 82 members). A few other counties like Sarasota, Lee, Orange, Duval, Leon, Volusia, Pasco and Collier have certified arborists/membership in the medium range. It makes sense that the most populated counties would have the most certified arborists and ISA members.

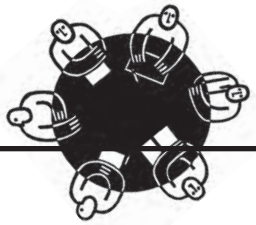
What about our newest membership category – Florida Chapter only? Will promoting this category reduce ISA International membership? The Board of Directors doesn't think so. We believe that most of us will continue our membership in both ISA International and the Florida Chapter. Remember, to get the discount on any exam fees to become certified or TRAQ qualified, applicants will need to be both International and Chapter members. To re-certify, they will also need to be both International and Chapter members in order to get the member price.

Then who would the Florida Chapter only membership benefit? It is those arborists, tree care workers and folks involved in the tree care industry that don't plan to become certified or members of ISA International but want the benefits of local membership.

- Electronic delivery of the quarterly newsletter Florida Arborist
- Access to the Florida Chapter lending library
- Discounts on Florida Chapter seminars statewide
- Discounts on Florida Chapter online learning
- Discount on annual Trees Florida Conference and Trade Show

The membership committee plans to start promoting Florida Chapter only membership to these groups in the near future. Hopefully, this will increase Florida Chapter ISA membership significantly.❖





Florida Chapter Board Updates

BOARD SHORTS:

2013 AWARD WINNERS

The Florida Chapter board is proud to have approved and presented this year's Chapter Awards at the June Trees Florida 2013 Conference in Fort Lauderdale:

- **Edward W. Bok Award** - Bruce Smith
  Recognition for lifetime achievement by exemplary practices to the goals and mission statement of the Florida Chapter ISA.
- **Award for Excellence in Education** - Dr. Jason Smith
  This award is given to an individual who has made an outstanding contribution to the education of the Florida Chapter members or to the sum knowledge of arboriculture.
- **Award of Distinction** - Mike Zimmerman
  This award shall be bestowed upon an individual, long standing active member (10 years or more) who has provided substantial, long-term contribution to the advancement of the purpose and substance of the Florida Chapter.
- **The Loren Westenberger Award** - Kathy Beck
  Awarded for the practice of professional principles consistent with the mission and objectives of the Florida Chapter ISA to better the environment for future generations.
- **The President's Award** - Joe Samnik
  For the guidance, advisement and support of the Florida Chapter ISA president.

Congratulations to the winners! Thank you for all you have done for the Florida Chapter ISA. ❖

TREE FUND AUCTION CRUISE

The Florida Chapter board approved a very special chapter contribution for the TREE Fund auction held at the International Conference in Toronto in early August. The Chapter voted to provide a Holland America cruise for two (valued at up to $7998 depending on cruise destination) to be auctioned off to the highest bidder at the annual event this year. The final auction value will be included in our Chapter Challenge amount for contributions to the TREE Fund for the year. Happy Travels to the winner of the cruise!❖

2015 International Conference in ORLANDO!

The Florida Chapter board would like to remind everyone of the honor the Chapter will have as host of the 2015 International Conference and Trade Show in Orlando in August of 2015! This means that there will be no Florida Chapter Trees Florida Conference in June that year. Local Host chair for the event is Don Winsett. International ISA and the Florida Chapter will be needing volunteers for assisting with on-site registrations and check-ins. If you feel you can help, mark it on your calendar!

Plans are to hold the 2015 International Tree Climbing Championship (ITCC) in Spring 2015 when the weather is cooler. This will require rescheduling the Florida Chapter Tree Climbing Championship (FCTCC) to Fall 2014. All climbers should keep this schedule change in mind for these future competitions. The 2014 schedule for the FCTCC (Feb/March) and ITCC (August) will remain unchanged.

BOARD MEETING SCHEDULE for 2013:

September 13, 2013 - Orlando
November 22, 2013 - Orlando

2013 Certification Exam Schedule

The FLORIDA CHAPTER of ISA is pleased to announce our 2013 schedule of Certification exams. See the chart below for the site nearest you.

Date	Exam/ Class	Location	Time	Proctor or Instructors	Last Date to Register	Cost Member/ Nonmem
December 14, 2013	Certified Arborist Exam	Miami-Dade IFAS 18710 SW 288 Street Homestead, FL	7:30 AM to 12:00 PM	Dr. George Fitzpatrick	Minimum 12 business days prior	$150/ $250
February 15, 2014	Certified Arborist Exam	Broward Co. IFAS 3245 College Avenue Davie, FL	7:30 a.m. to 12:00	Dr. Mike Orfanedes	Minimum 12 business days prior	$150/ $250

This schedule is subject to change as additional tests and review sessions may be added. Visit www.floridaisa.org for updates.

For an application form to register for an Exam call the ISA Office in Champaign, IL at 888-472-8733
To purchase an ISA Certification Study Guide, call the Florida Chapter ISA at 941-342-0153 or fax an order form to 941-342-0463.

The ISA Illinois must receive your application & exam fees A MINIMUM OF TWELVE BUSINESS DAYS prior to the exam date. NO EXCEPTIONS! (ISA Illinois is closed New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the day after, and Christmas Day). First-time applicants can apply online at *www.isa-arbor.com*.
PREPAYMENT IS REQUIRED VISA/MC/AMEX accepted. US FUNDS ONLY

Florida Chapter ISA - 2013 Education Schedule

***The schedule below is tentative and subject to changes.**

Date	Seminar/Class	Location (s)	Open for Registration
August 30, 2013	Trees and the Law	Orlando	*Register Online*
September 6, 2013	Trees and the Law	Tampa	*Register Online*
September 24, 2013	Mature Tree Care	Tallahassee	*Register Online*
September 26, 2013	Mature Tree Care	Miami	*Register Online*
September 24, 2013	Mature Tree Care	Tallahassee	
October 29, 2013	Pruning with Dr. Ed Gilman	Pinellas	
October 25, 2013	Pruning with Dr. Ed Gilman	Orlando (Leu)	
October 22, 2013	Pruning with Dr. Ed Gilman	Ft. Lauderdale	
October 2013	Arborist Safety - Spanish Language	Tampa	
October 2013	Arborist Safety	Tampa	
October 2013	Arborist Safety	Orlando	
November 2013	Tree Risk Assessment Qualification	Tampa	

Welcome!

New Florida Chapter Members

Here are the individuals that joined the Florida Chapter during the first quarter of 2013. If you see a name from your area of the state, look up their phone number online* and give them a call. Introduce yourself and find out what aspect of arboriculture the new member is involved in. Let's make the Florida Chapter friendlier. We're all working in different ways for the same goals. Get to know other chapter members. You might make some helpful connections for the future.

First Name	Last Name	City	State	First Name	Last Name	City	State
Jose	Rausseo	LAKELAND	FL	Michael	Falconer	SARASOTA	FL
Sean	Creedon	RANDOLPH	NJ	Ray	Harper	MILTON	FL
Denis	Colindres	CLEARWATER	FL	Rick	Harman	W. PALM BEACH	FL
Frank	Pollard	ORLANDO	FL	Vincent	Cosse	SINGAPORE	SINGAPORE
Minesh	Patel	ORLANDO	FL	Logan	Patterson	JACKSONVILLE	FL
David	Hawkins	KEY WEST	FL	Troy	White	NAPLES	FL
Gabriel	Paredes	WINTER PARK	FL	Reynaldo	Figuero	NAGUABO	PR
Stephanie	Bledsoe	DE LEON SPRINGS	FL	Barbara	Fair	RALEIGH	NC
James	Hodgdon	MARCO ISLAND	FL	Andrew	Houle	WESLEY CHAPEL	FL
Brittany	Adamo	BONITA SPRINGS	FL	Brian	Walker	PENSACOLA	FL
George	Murphy	NOKOMIS	FL	James	Behrens	JACKSONVILLE	FL
Paul	Lloyd-Jones	INVERNESS	FL	Mark	Mitchell	JACKSONVILLE	FL
John	Rivera	SW RANCHES	FL	Roy	Fitzgerald	DUNEDIN	FL
Michael	Farrell	NEW BRUNSWICK	NJ	Joseph	Sewards	DELAND	FL
Anthony	Marcello	TARPON SPRINGS	FL	Matthew	Layne	BARTOW	FL
Shan	Yeung	WONG TAI SIN	HONG KONG	Robert	Sabo	ST PETERSBURG	FL
Lyle	Adams	CLEARWATER	FL	Edward	Keenan	TAMPA	FL
James	Walters	GREENWOOD	SC	Joseph	Guerrero	WEBSTER	FL
John	Crawford	LITHIA	FL	Alice T	ate-Barnett	LAKE MARY	FL
Kathleen	Allen	LEHIGH ACRES	FL	Bradford	Young	TAMPA	FL
Teri	Graham	PALM BAY	FL	Dagoberto	Monrroy	ORLANDO	FL

Go to http://www.isa-arbor.com, then go to "Members Only" and log in. Then go to ISA membership directory. If you do not know your log in for members only, contact ISA headquarters at (888) 472-8733. Once you log in, you can update your address, check your CEU's, edit or verify Certified Arborist information and search the membership list.

Letters to the Editor

We welcome your thoughts about Florida Arborist articles, about your Florida Chapter, or about tree issues in general.

Email your letters to:
floridaisa@comcast.net

or mail to:
Florida Chapter - ISA
7853 S. Leewynn Court
Sarasota, FL 34240

Please remember:
Letters should be no longer than 300 words.
We reserve th right to condense letters, or to edit as necessary.

An invitation to all members

to attend a

Board of Directors Meeting!

Call 941-342-0153

for specific times and locations

Up-coming 2013 Board Meeting - Dates & Locations

June 8, 2013 - Ft. Lauderdale (Trees Florida 2013)
September 13, 2013 - Orlando
November 22, 2013 - Orlando

Arborist Certification Committee Report

By Norm Easey, Florida Certification Liaison

There are ISA exams scheduled at various locations in Florida. *Click here for the specific dates.* The ISA Certified Arborist exam is also now available at Pearson Testing Centers throughout Florida. See the ISA International web site www.isa-arbor.com for more information about the various ISA arborist credentials and how to earn them.

The Florida Chapter would like to congratulate the following 35 individuals for earning their Arborist Certification or Utility Arborist Certification during the second quarter of 2013:

Certified Arborist

Lyle Adams, Clearwater, FL
Michael Anchel, Boynton Beach, FL
James Behrens, Jacksonville, FL
Stephanie Bledsoe, De Leon Springs, FL
David Botolino. Newton, NH
Brian Brown, Largo, FL
Richard Brunner, Tamarac, FL
Christopher Cianfaglione, Sarasota, FL
Denis Colindres, Clearwater, FL
Catherine Corcoran, Redington Beach, FL
Sean Creedon, Randolph, NJ
Stan DeFreitas, Oldsmar, FL
Christopher Denson, Royal Palm Beach, FL
Charles Diaz Jr., Palm Harbor, FL
Benjamin Glenn Essig, Miami, FL
Elijah George, Gainesville, FL
Teri Graham, Palm Bay, FL
John Korycki, The Villages, FL
Alfred Lewis, Lincolnville Center,ME
Paul Lloyd-Jones, Inverness, FL
Anthony Marcello, Tarpon Springs, FL
Peter Martens, Safety Harbor, FL
Matthew Murphy, Jupiter, FL
William Needham Jr., Ocala, FL
Brian Ottoson, Saint Petersburg, FL
Frank Pollard, Orlando, FL
Timothy Praay, Saint Petersburg, FL
Brian Reed, Tampa, FL
David Rivera, North Lauderdale, FL
Wayne Scott, Clearwater, FL
Kenneth Smith, Ozona, FL
Steven Stubbe, Oldsmar, FL
Marcus Thomas, Miami, FL
Christopher Towerton, Fort Pierce, FL

Utility Arborist

Christopher Towerton, Fort Pierce, FL

Are you thinking about becoming certified?
Visit the International ISA website
to access the certification application handbook with further information.

International Society of Arboriculture
Florida Chapter

Our Mission: "To Promote and Improve the Scientifically Based Practice of Professional Arboriculture"

Arborist Code of Ethics

Strive for continuous self-development by increasing their qualifications and technical proficiency by staying abreast of technological and scientific developments affecting the profession.

Not misuse or omit material facts in promoting technical information, products or services if the effect would be to mislead or misrepresent.

Hold paramount the safety and health of all people, and endeavor to protect property and the environment in the performances of professional responsibilities.

Accurately and fairly represent their capabilities, qualifications and experience and those of their employees and/or agents.

Subscribe to fair and honest business practices in dealing with clients, suppliers, employees and other professionals.

Support the improvement of professional services and products through encouraging research and development.

Observe the standards and promote adherence to the ethics embodied in this code.

Florida Arborist
Florida Chapter ISA
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