Call for Research Track Papers and Poster Presentations
Florida Native Plant Society
2014 Conference

The Florida Native Plant Society Annual Conference will be held at Florida Gulf Coast University, Fort Myers, Florida, May 15-18, 2014. The Research Track of the Conference will include presented papers on Friday, May 16 and Saturday, May 17. The poster session will be on Saturday, May 17.

Researchers are invited to submit abstracts on research related to native plants and plant communities of Florida including preservation, conservation, and restoration. Presentations are planned to be 20 minutes in total length (15 minute presentation, 5 minutes for questions).

Abstracts of not more than 200 words should be submitted as a MS Word file by email to Paul A. Schmalzer at paul.a.schmalzer@nasa.gov by February 1, 2014. Include title, affiliation, and address. Indicate whether you will be presenting a paper or poster.

FNPS 2014 Endowment Grant Research Awards and Conservation Grant Awards

Endowment Research Grants
The Florida Native Plant Society maintains an Endowment Research Grant program for the purpose of funding research on native plants. These are small grants ($1,500 or less), awarded for a 1-year period, and intended to support research that forwards the mission of the Florida Native Plant Society which is “to promote the preservation, conservation, and restoration of the native plants and native plant communities of Florida.”

FNPS Conservation Grants support applied native plant conservation projects in Florida. These are small grants ($1,500 or less) awarded for a 1-year period. These projects promote the preservation, conservation, or restoration of rare or imperiled native plant taxa and rare or imperiled native plant communities. To qualify for a Conservation Grant, the proposed project must be sponsored by an FNPS Chapter.

For application guidelines: visit www.fnps.org, and click on ‘Participate/Grants and Awards’.

Email questions about the grant programs to info@fnps.org
Application deadline: March 7, 2014.

Awards will be announced at the 2014 Annual Conference in Fort Myers. Awardees do not have to be present at the Conference to receive an award.

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Editorial Content
We have a continuing interest in articles on native plant species and related conservation topics, as well as high-quality botanical illustrations and photographs. Contact the editor for guidelines, deadlines and other information. Editor: Marjorie Shropshire, Visual Key Creative, Inc.
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ON THE COVER:
Vaccinium stamineum growing in a large population of wild plants, Hamilton County, Florida, late July. (Photo by Paul Lyrene).

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Your membership supports the preservation and restoration of wildlife habitats and biological diversity through the conservation of native plants. It also funds awards for leaders in native plant education, preservation and research.

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History of the disease

Laurel wilt is an irreversible vascular wilt disease that kills most native members of the Lauraceae plant family. Red bay (Persea borbonia) and swamp bay (P. palustris), are the most common members of this family in peninsular Florida and have sustained significant mortality. Other native members of the Lauraceae that are susceptible to the pathogen are silk bay (P. borbonia var. humilis), northern spicebush (Lindera benzoin) and sassafras (Sassafras albidum) (Hughes et al 2012, Hughes et al. 2011, Fraedrich et al. 2008). In addition to these common species, two endangered shrubs have been demonstrated experimentally to be susceptible; pondberry (Lindera melissifolia) and pondspice (Litsea aestivalis) (Hughes et al. 2011, Fraedrich et al. 2008). Preliminary tests suggest that lancewood (Ocotea corticaed), a subtropical shrub/small tree, is not as susceptible to the disease as other members of the plant family (Hughes, personal communication). Of great concern is the future of avocado (P. americana) — all the varieties tested of this economically important ornamental and agricultural tree are susceptible (Ploetz et al. 2012). Unfortunately, the invasive camphor tree (Cinnamomum camphora) is tolerant of the pathogen and rarely dies.

To date, it is believed that millions of trees in the southeastern coastal plain have been killed. The non-native fungal pathogen, Raffaelea lauricola (Harrington et al. 2008), is transmitted to the sapwood of healthy trees by its symbiont, the female Asian redbay ambrosia beetle, Xyleborus glabratris (Fraedrich et al. 2008) (Fig 1). The non-native beetle was first detected near Savannah, GA in 2002 (Rabaglia et al. 2006). Since then, laurel wilt has caused the mortality of over 90% of the red bay trees (greater than 2.5 cm DBH) at Fort George Island, FL (Fraedrich et al. 2008) and 100% of the mature red bay trees in Etoniah Creek State Forest, Putnam County, FL (Shields et al. 2011) in less than 4 years.

Review of the biology and symptoms of the disease

Typically, ambrosia beetles utilize dead or dying trees to complete their life cycle. However, for some unknown reason, this particular non-native ambrosia beetle has been attacking healthy trees (Fig 2). The first symptom of the disease is the wilting of leaves, usually encompassing entire branch ends. As the disease progresses, the wilt spreads to other portions of the canopy and can kill the tree in as little as a week in the summer. After many months, frass tubes will become evident on the bark as the beetle activity increases (Fig 3). Research has also demonstrated that the fungal pathogen can remain alive inside a standing dead red bay tree for at least a year (Spence et al. 2012).

The tiny redbay ambrosia beetle (~2 mm) (Fig 4) is attracted to the smell of red bay. The female beetle bores pin-hole sized holes into branches or the trunk of a tree, where she either actively or passively deposits spores of R. lauricola in the tunnels.
The Status of Laurel Wilt

**Figure 3** – Frass tubes on a tree (Photo D. Spence).

**Figure 4** – Smooth elytra and pronotum (photo from M. Thomas, Bugwood.org)

**Figure 5** – Disease cycle of laurel wilt, developed by Marc Hughes (available online: http://www.fs.fed.us/r8/foresthealth/laurel_wilt/disease_cycle/laurel_wilt_in_redbay.jpg)

(Fig 5). Adults and larvae feed on the ambrosia fungus (ambrosia = “food of the gods”) that grows in the tunnels. It takes approximately 30 days for an egg to develop into an adult (Brar 2013). Depending on whether or not a female beetle was fertilized, eggs can develop into either haploidy wingless males or diploid females.

Since its initial invasion into the U.S., the biology of the disease continues to be elucidated (Hanula et al. 2008, Hughes et al. 2011) and continues to confound traditional wisdom about these beetles and their fungal symbionts. It is still unknown exactly how *R. lauricola* causes trees to wilt and die, however, evidence suggests that the host tree “over-reacts” to the presence of the pathogen and kills itself (Inch and Ploetz 2011). A better understanding of the mechanisms underlying susceptibility and resistance are needed to accelerate the development of resistant species in the future.

**Current and potential range of laurel wilt**

The disease currently ranges from North Carolina to Florida and west to Mississippi. South Carolina, Georgia, and Florida have a widespread distribution of the disease while its occurrence in North Carolina, Mississippi and Alabama...
A Land Management Review Experience

Article by Gail Fishman and Scott Davis

Above: Land management review participants gather at Holton Creek Pine Plantation.

Thursday, May 30, 2013, began early, as Scott Davis and I drove from Tallahassee to the Suwannee River Water Management District office in Live Oak, Florida. We were representing the Florida Native Plant Society on the land management review team. Periodic reviews are conducted on lands purchased with public conservation funds such as P2000 and Florida Forever. As a non-government organization, FNPS has had a representative on each land review since 2010.

We arrived at the District office in plenty of time. The morning's cool-ness was about gone and we knew the day would become much hotter. Before the tour began, a short indoor presentation introduced each area we would visit including successes and problems that needed more attention. In addition to District staff and some members of the governing board, others represented Florida Fish and Wildlife Conservation Commission, Florida Trail Association, Florida Division of Forestry, Florida Natural Areas Inventory, Wild Turkey Federation, the prescribed fire contractor, a retired forester, and private landowners.

SRWMD manages some 7,640 square miles across all or part of 15 north-central Florida counties. We had time to visit only three places, a floodplain swamp on the Alapahoochee Tract, Holton Creek, and an upland pine plantation on Holton Creek. Needless to say we spent most of the day in a van riding over narrow rural roads past cornfields, pastures, and scattered planted pinelands and a fair amount of time jouncing over two-track dirt roads.

District lands are deemed multiple use with a primary emphasis on water resource protection as well as maintenance and restoration of natural areas, and recreational public use. At each stop, staff provided an overview of their management practices regarding restoration and monitoring of endangered or threatened species followed by time to ask questions. They fielded many queries.

SRWMD is charged with managing and restoring some heavily degraded forest areas. Prescribed fire, usually conducted by a contractor, is the tool used most often; chopping, mowing, and herbicides or some combination are also employed. Different methods and timing are determined for each site. The District uses employees, volunteers, and contractors to get the job done. Although specifics are written into contracts, unless
someone from the staff oversees the work the outcome may not be met. Using contractors for planting trees may meet a short-term fiscal goal but could cost more in the long run in time and money.

Standing beside the small area, I thought about how the land might have appeared on a similar afternoon a century earlier. I imagined widely spaced, tall longleaf pines, each bearing turpentine scrapes and collection cups. Young pines would have been shooting up among the older trees, for natural regeneration was not discouraged back then. I could see numerous gopher tortoise burrows and the track of a large indigo snake. Many birds foraged in the canopy and groundcover. But that was then. Now I wonder at how long it will take to put it all back.

Fire, chopping, and herbicide. Getting rid of hardwoods. Replacing groundcover plants. These are the first steps in bringing back longleaf. Fire must be part of the plan since many species have evolved with this natural event. Chopping and herbicides are less desirable in our opinion, since small mammals and reptiles may be at risk from the chopper. We are concerned about herbicides, especially in the hands of contractors. Too often native plants are killed because it is just plain hard to target one plant without hitting adjacent plants, especially if those plants are small and hidden.

Also, many contractors erroneously treat native plant species, often mistaking them for an exotic invader.

We found it difficult to judge the total amount of herbicide being used for site preparation and invasive control. Eighteen acres on Holton Creek were prepped with herbicide in 2012, and it appears that at least an additional 1,100 acres were treated during 2011 – 2012.

Monitoring for endangered and threatened species is conducted on a three year rotation and incidental observations may be included. The report states that “Staff is reviewing this data to determine if there are opportunities for increased efficiency in monitoring.” We hope they find that increased monitoring is needed and at different seasons of the year. With the current exclusion of any environmental presence on any Water Management Board, more concern for endangered species is doubtful. Shrinking budgets and no environmental voice make the districts smaller, weaker, and less capable of protecting our water and other natural resources.

After returning to the offices we were asked to complete a scorecard. This provided an opportunity to relate our conclusions in written form for the staff, and was an exercise not to be taken lightly.

It is imperative that FNPS continue to participate in land management reviews. The benefits are many — we can be on the ground with land managers and hear their plans — and sometimes their woes. We can show support, offer our expertise, and provide informed comments and suggestions to help them manage state lands more effectively.

About the Authors
Gail Fishman lives in Tallahassee, where she works as a writer and naturalist. She is the author of Journeys Through Paradise: Pioneering Naturalists in the Southeast. Gail is a ranger at the St. Marks National Wildlife Refuge and helped establish the St. Marks Refuge Association.

Scott Davis has a degree in biology from Florida State University, and works as a ranger at the St. Marks National Wildlife Refuge. His interests include botany, herpetology, and native landscaping. Scott is a member of FNPS’ Magnolia Chapter.

Above: Scott Gregor and Scott Davis.
The Status of Laurel Wilt (continued from page 5)

is spotty (Fig 6) (USFS 2013). In Florida, 38 of 67 counties have been found to have laurel wilt. In 2012, the disease was positively identified in the avocado groves of south Florida, threatening this important agricultural crop (Mayfield et al. 2008b, Ploetz et al. 2011).

The anthropogenic movement of the redbay ambrosia beetle and the fungal pathogen are believed to have contributed to the rapid expansion of the disease range (Mayfield 2007). Since the beetle and the fungus have moved across the southeast, it is possible that they will move to the other avocado producing regions in California, Australia, Mexico, the Middle East, Central and South America, Africa, China, and Spain.

The future of Persea biodiversity

When plants and animals are attacked by disease, due to genetic variability, a few individuals may not be as susceptible or not susceptible at all, and survive. However, as noted above, this disease is killing greater than 90% of all mature individuals within a few years. But, there is a glimmer of hope. Researchers at the University of Florida's Forest Pathology Laboratory in Gainesville, FL have found a few individuals still alive in areas where all other red bay trees have been dead for 5 years or more (Hughes et al. unpublished). Through cuttings, they have propagated clones of these survivors and they are being tested to verify resistance. If these individuals are resistant, or even tolerant, they could potentially be used reintroduce red bay into Florida's forests.

Female redbay ambrosia beetles often choose larger diameter trees over small ones (Fraedrich et al. 2008). A survey of the coastal strand of Guana Tolomato Matanzas National Estuarine Research Reserve by this author in December of 2012 found that greater than 90% of small red bay plants (stem dia. > 1") were still alive while most of the larger trees had died. This is not only good news for redbay but for the Palmedes Swallowtail butterfly (Papilio palamedes) as well. The Palmedes Swallowtail depends on Persea sp. as a larval food source (Hall and Butler 1998) and these small plants may be able to provide enough of a resource to keep the species from going extinct.

Lauraceae dominates in many Central and South American countries, further expanding the potential impact of this disease. It is still unknown whether these species will be susceptible to the disease, but every effort should be made to prevent the introduction of laurel wilt into these areas.

Recommendations for homeowners and communities

An important component to managing plant diseases is sanitation by the removal of diseased tissue from a tree/plant or an area. Unfortunately, laurel wilt is too widely disseminated to eradicate it or stop its progression; however, slowing its spread is possible. In an attempt to study how effective sanitation can be, dead red bay trees were cut down and chipped with a standard tree chipper and placed in piles. The fungal pathogen that initially killed the trees was found to persist for only 2 days in wood chips. In addition, a few beetles did survive the chipping event, but overall their population was reduced by 99% (Spence 2012). Therefore, we recommend the removal and chipping of all dead host species to reduce the wood available for the redbay ambrosia beetle, which will reduce the opportunity for the female beetles to lay more eggs and multiply.

Figure 6 – Current distribution of LW in the southeastern United States as of August 2013. http://www.fs.fed.us/8/foresthealth/laurelwilt/dist_map.shtml
Systemic fungicide (propiconazole -Alamo®) injections have been somewhat effective (approximately 60% survival – Spence unpublished) at protecting red bay trees against laurel wilt. It is an expensive treatment and so far only one method of fungicide injection has been tested (Mayfield et al. 2008c, Spence unpublished). For the systemic macroinfection of the fungicide to be effective, trees have to be injected before any symptoms of wilt are observed. In a few cases however, trees that had been treated with the fungicide still developed limited areas of wilt. These diseased areas were pruned out and all but one of these trees survived. The other common method of tree injection was developed by Arborjet®. This method uses microinjectors that deliver a smaller amount of fungicide. Results on the effectiveness of this treatment method against laurel wilt have not been published. Likewise, it is unclear if a soil drench with a systemic fungicide would be effective. If fungicides are used by a knowledgeable professional or by the homeowner, the chemical should be used in accordance with instructions and mix rate on the label.

Since the redbay ambrosia beetle is so small, insecticides are unlikely to be useful as a means of protecting trees. In addition, broadcast spraying of insecticides would be harmful to the environment and other beneficial insects (Raupp et al. 2010) and ineffective against the redbay beetle (Pena et al 2011). Several trees in the Volusia County area were sprayed with Pinesol® as a cover protectant, to “hide” the tree from detection by the beetle. However, when used every 6 to 10 weeks, all trees eventually died. A cover spray or the use of baits that are more attractive than the trees themselves may ultimately become useful tools to protect trees, but at this time, no compounds have been identified.

What people can do is prevent movement of untreated wood products (logs/firewood). This disease, along with others in the USA and around the world, is easily spread by people. Even though the redbay ambrosia beetle can fly, laurel wilt was found far from the nearest known outbreak on several occasions (Mayfield 2009). The pathogen and symbiont were most likely moved by people. In response to this, the state of Florida developed a regulation in 2010 that prohibits the movement of non-certified firewood into or out of the state and untreated wood products cannot be moved more than 50 miles within the state. With the large number of tourists and seasonal residents who use Florida's numerous campgrounds, there is a high risk of the movement of the redbay ambrosia beetle or other exotic insects in untreated firewood. Buy firewood locally. For more information on the danger of moving firewood, visit don'tmovefirewood.org.

The tragedy caused by exotic organisms

The movement of exotic organisms has increased dramatically over the last 200 years, and although the impact is often limited, numerous exotic pest introductions have led to significant ecological and/or economic damage (Pimentel 2005, Liebhold et al. 1995). Specifically, wood-borne pests have negatively impacted silvicultural production (Pimentel 1986), urban arboriculture (Dreistadt et al. 1990) forest ecology (Liebhold et al. 1995) and horticultural crops, such as avocado (Evans et al. 2010). The primary means of movement of invasive plant pests has been through the importation of ornamental plants from other countries (Perings et al. 2005) and in untreated wood products (Bridges 1995), which may have been how laurel wilt arrived in the US. It is estimated that approximately 50,000 exotic species are established in the United States (Pimentel et al. 2005). At U.S. ports of entry alone, 6,788 individual exotic scolytid beetle interceptions were made between 1985 and 2000 at inspection stations (representing 67 species), one of which was X. glabratus in 2002. These beetles came from 49 different countries (Haack 2001). One current tragedy in the Mid-Atlantic States was the introduction of the hemlock woolly adelgid on ornamental nursery stock (Havill et al. 2006). Though it is not likely to migrate to Florida, this small insect is decimating two species of hemlock throughout the Appalachian Mountains (Ford and Vose 2007) and may change the forest ecology there for hundreds of years to come (Block et al. 2012).

Whether they are exotic weeds, animals, insects or disease-causing microbes, a 2005 study estimated that annual losses for forest and non-forest products cost the American taxpayer $138 billion each year (Anagnostakis 2001, Aukema et al. 2010, Cox 1999, Pimentel et al. 2005). While most are incapable of causing harm to forests, a select few have had devastating consequences (Aukema et al. 2010). To combat these problems, the United States is a signatory on an international treaty (IPPC) that aims to protect cultivated and native species by preventing the spread of plant pests. The USDA’s (2013) Department of Animal and Plant Health Inspection Service is the federal agency that attempts to identify potential pests and manage their impact once they arrive. That being said, laurel wilt is not causing trees to die in Asia, which means it is not a pest or disease there and was unknown to science. Since there are no reports of this disease in Asia, it is likely that the redbay ambrosia beetle, R. lauricola, and native laturcous species co-evolved. Laurel wilt has been a catastrophic unintended consequence and highlights the danger of moving organisms around the globe, whether through trade, natural dispersal, or by accident.

Laurel wilt is one of many plant diseases – more are on their way to Florida

Laurel wilt likely resulted from the arrival of the beetle by way of transport inside untreated wood or wood products (Hanula et al. 2008, Mayfield 2009). Whether it was carried
here in solid wood packing materials (e.g. wooden pallets) or logs is unknown.

Was laurel wilt an aberration? No, it could happen again. Unfortunately, it is only one of a dozen or so tree diseases and insect pests that are either in the state or could potentially end up in Florida. Pests and diseases that threaten Florida include: emerald ash borer that kills ash trees, Asian longhorned beetle that kills maples and other hosts of other hardwoods, oak wilt, bot-canker of oaks, spiraling whitefly which has a wide host range of native and ornamental species, walnut twig beetle and thousand cankers disease of black walnut, sudden oak death, Texas phoenix palm decline, red palm mite, citrus canker, and citrus greening.

Literature Cited


Hughes, M. unpublished. Laurel wilt resistant Persea borbonia genotypes.


Spence, D. J. unpublished. Use of propiconazole to protect redbay trees against laurel wilt.


What can you do?
• Don’t move un-treated wood products (logs/firewood).
• Don’t bring back un-treated wood products, raw plant products, green wood, or newly-cut logs from trips abroad. But you know this because you are a Native Plant enthusiast! You are a member of the best environmental educational/research/support organization in the state! Let’s work to keep our native plants healthy. ☀

About the Author
Dr. Spence is an adjunct Professor of Biology at Stetson University and Dr. Smith is an Associate Professor in the School of Forest Resources and Conservation at the University of Florida.
Mark Tercek, The Nature Conservancy’s CEO, had worked at Goldman Sachs since 1984 and his last position was director of Goldman’s relatively new Environmental Strategy Group, which worked to increase investments in sustainable energy. He was either very smart or simply lucky to have left his position at Goldman Sachs in 2008 to take over the reins of TNC, a mere two months before the economy tanked. The recession created a disaster for nonprofits, left to fend for themselves with fewer donations and huge reductions in asset values. Tercek’s experience as an investment banker made him the perfect person to help TNC through some really tough times.

When I heard that Tercek had written this book, I ordered a copy. The book’s genesis came from a series of talks that he’d put together. Although Tercek brought in biologist and science writer Jonathan Adams to help him modify the content of the talks to add more detail and more science, the book is still written from Tercek’s point of view.

In the introduction, Tercek writes: “Environmentalists generally believe in nature’s inherent value. That idea is the bedrock of the environmental movement. However, environmentalists cannot persuade everyone to think along the same line. Focusing only on the innate wonders of nature risks alienating potential supporters and limits the environmental community’s ability to reach a broader audience and to mine sources of new ideas. The ‘isn’t nature wonderful?’ argument can leave the impression that nature offers only aesthetic benefits or, worse, that nature is a luxury good that only rich people or rich countries can afford. We need to get business, government, and individuals to understand that nature is not only wonderful, it is also economically valuable. Indeed, nature is the fundamental underpinning to human well-being.”

Being a banker, he adds, “…concepts such as maximize returns, invest in your assets, manage your risks, diversify, and promote innovation are the common parlance of business and banking. These are rarely applied to nature, but they should be.”

The nine chapters cover a wide variety of topics, but each tells a series of stories covering one topic and most include personal anecdotes that make them very readable. I loved how Tercek related that during his first days on the job, he was at a town hall meeting and was drinking water from a plastic water bottle. The next day his coworkers had left a bunch of reusable bottles on his desk. He appreciated their thoughtfulness, but was also struck by the realization that environmentalists cannot buy reusable water bottles for everyone. He said, "It seems as if that has been the retail strategy for saving nature: person by person, special place by special place. That will not be enough – not anymore. Making a difference means showing how nature matters to millions of people who may not have noticed it."

I’d recommend this book to environmentalists because it covers new territory in how a non-profit environmental organization can become much more effective by reaching out to new people who may not have noticed nature as an asset, and more importantly, by working with commercial enterprises that may have had large ugly environmental footprints. We may have to hold our noses because of past damage done, but if we can stop off our soapboxes and get them to the table, then everyone can move forward to benefit the environment. Because their environmental footprints are large, even a small change could have a larger positive impact than a large change in a small footprint.

All movements toward green are beneficial, but we worry about "green-washing" where groups appear to be environmentally friendly, but may not be actually accomplishing much. This book provides useful examples of how to reach out to new audiences with good arguments for why they should consider nature as an asset and examples of how other groups have really made a difference. The book also shows that commercial and environmental interests are not in opposition, but can be partnered in ways we might not have thought about before. Read it for yourself.

To continue my outreach to state officials, I gave a copy of the book to my state senator, Rob Bradley, to impart the message that preserving Florida’s environment is NOT anti-business. To read a post I wrote just after the elections on how I prepared to address the Clay County Delegation, which includes Bradley, before the legislative sessions began, visit http://nativeplantwildlifegarden.com/supporting-wildlife-beyond-your-garden-gate/

Author's note: I've been a Nature Conservancy member for many years and donated 50% of the royalties of my book "Sustainable Gardening for Florida" to the Florida branch of TNC.

Ginny Stibolt earned her MS in botany at the University of Maryland and has written Sustainable Gardening for Florida and Organic Methods for Vegetable Gardening in Florida – both published by University Press of Florida. In addition Ginny has been a lead blogger for FNPS since 2010.
Cross-pollination

to ensure fruit and seed from native plantings

Article and photos by Paul Lyrene
Emeritus Professor, Horticultural Sciences
Department, University of Florida, Gainesville

Vaccinium arboreum in home garden, after good cross-pollination, early August. Berries will be ripe in mid-September.
Native plants in the home landscape supply food for birds and animals and seed that can re-establish native plants in areas from which they have been extirpated. These benefits will not be realized if the native plants we plant do not produce fruit and seed.

A decade ago, I planted four yaupon bushes (*Ilex vomitoria*) in my back yard. One plant had a weeping structure and produced only female flowers. Two plants had upright, spreading architecture, which is normal for yaupon growing in the woods, and they also produced only female flowers. The fourth was a vigorous, compact horticultural variety that came to us free of charge during a native plant giveaway. It grew vigorously for 7 years, became quite large and had beautiful foliage, but never flowered. The three female yaupons flowered each year but produced few berries. Two years ago, tired of waiting for a miracle, and wanting yaupon berries to attract cedar waxwings to my garden, I visited an abandoned field near Crestview where hundreds of yaupon bushes were growing – half full of red berries and the other half with no berries. I dug 2 sprouts from a plant with no berries, assuming that it was male, and grew them in pots of peat for one year. One sprout developed enough roots to support itself, and last winter I replaced the city ornamental with the small new plant, presumably male. This spring I eagerly waited to see if it would flower, and if the flowers would open at the same time as those on my three lonesome female yaupon plants. I worried that this new addition might flower later, being from farther north and west, but I am happy to report that the new male plant produced several hundred flowers that opened early enough to catch the second half of the female flowers, and that this year I have ten times more yaupon berries than ever before.

Flowering plants can be arranged into several groups according to whether they need cross-pollination to produce fruit and seed. Some commonly-recognized categories include cleistogamous plants, self-pollinating plants, dioecious plants, monoecious plants, and plants that have perfect (bisexual) flowers but cannot self-pollinate due to genetic self-incompatibility.

In cleistogamous plants, self-pollination occurs before the flowers open, and cross-pollination is precluded. Self-pollinating species that are not cleistogamous produce abundant seed from their own pollen, but some cross-pollination may also occur if other plants of the same species are flowering nearby. Many important crop plants, such as wheat, soybeans, peanuts, cotton, and sunflowers are largely or completely self-pollinated.

Continued on page 14
Cross-pollination (continued from page 13)

Many Florida native trees and woody shrubs, and a smaller number of herbaceous native plants, are dioecious. In dioecious species, some plants produce flowers with viable pollen and non-functional pistils and other plants produce mainly or exclusively flowers with viable pistils (stigma, style, and ovary) but little or no viable pollen. The list of dioecious native plants in Florida is long and includes, to mention a few, Diospyros virginiana, various Ilex species, Juniperus virginiana, Vitis rotundifolia, Acer rubrum, Myrica cerifera, Baccharis halimifolia, Chionanthus virginicus, and Polygonella gracilis. As pointed out by Hipp (1994), in some dioecious species, plants of either sex may occasionally produce a few flowers of the opposite sex, allowing an isolated tree to make an occasional fruit. Chionanthus virginicus and Diospyros virginiana are examples. In Ilex, a genus in which most species are dioecious, there is one interesting exception to the rule that one isolated tree will produce little fruit. The first-generation hybrid between dahoon holly (I. cassine) and American holly (I. opaca) produces heavy berry crops every year, even when planted as an isolated tree (Hipp, 1994). A hybrid of this type is the east Palatka holly.

According to Harold Hume (1953), most holly species cannot successfully pollinate trees of a different holly species. Interspecific cross incompatibility is the rule among species that are native in the same areas and flower at the same time. If such pollination barriers did not exist, the two species would blend into one. Interspecific crosses are not uncommon in plants, but these usually occur on disturbed sites or where plants of one species have been transplanted into the range of a closely-related species.

Monocious species (for example squash and corn) produce male flowers and female flowers on the same plant. Having anthers and pistils in different flowers promotes cross-pollination but does not necessarily preclude self-pollination. In corn, which has been exhaustively studied, seedlings resulting from self-pollination are markedly weaker than those resulting from cross-pollination.

Many species that have perfect flowers (each flower containing functional anthers and pistils) are genetically self-incompatible and require cross-pollination to produce viable seed. In these plants, pollen that is viable on other plants of the same species does not function on pistils of the plant that produced it. Self-incompatible species have genetic systems that recognize and inactivate pollen that falls on stigmas of the plant that produced it.

Self-incompatible species that have perfect flowers are not as easy to recognize as dioecious species, and native plant gardeners may not recognize a potential problem from planting a single plant. No publication I am aware of lists the species in which self-incompatibility could be a problem for native-plant gardeners. A Gardener’s Guide to Florida Native Plants, by Rufino Osorio gives information on the pollination requirements of some plants, but most other wildflower books say nothing about pollination requirements. This is probably because pollination determines seed production but does not affect flowering, and homeowners who care only about having flowers need not be concerned about pollination.

From experience, I know that none of the native Florida blueberry species make much viable seed without cross-pollination. The same is true of the Florida Prunus species, including plums and cherries. I suspect that most woody or perennial Florida native plant species are either dioecious or self-incompatible. Annual wildflowers are more likely to be self-compatible, but since the plants are small, it is easy to plant several seedlings to ensure cross-pollination if necessary.

Self-incompatibility systems are subject to inactivation by mutations, and in some cases, plant breeders have been able to develop self-compatible cultivars from self-incompatible species. This raises the question of why so many native plants are self-incompatible. Reproduction would seem to be more secure if every plant could produce viable seed without requiring pollination by a second plant of the same species. This question was thoroughly discussed by Charles Darwin in The Origin of the Species, who gave the answer that is accepted today by most biologists. In this ever-changing world, teeming with pathogens and predators, where species must compete for space and resources, only those species that are capable of rapid change will survive for long. Outcrossing allows species to adapt more quickly to changing conditions by enabling favorable mutations that occur in one plant to come together with different favorable mutations that occur in other plants of the same species. The most successful genetic combinations survive and propagate, maintaining the species. Self-pollinating species may be highly successful in the short term, but outcrossing species are better able to change and persist.

In native plant nurseries, propagation by cuttings rather than by seed can contribute to the problem of poor seed production in native plantings. If a customer buys plants propagated by cuttings taken from the same stock plant, the plants are genetically the same and cannot cross pollinate each other. Native plant propagators need to know which species are dioecious and which are self-incompatible, and nurseries should help buyers obtain plants of compatible mating types. Homeowners who want to increase their chances of getting fruitful combinations might do well to obtain plants from several sources.

Over what distance can you expect to get good cross-pollination between two plants? The answer depends on many factors. In flowers that are pollinated mainly by wind, several hundred feet might be the limit for good fruit set, unless an abundance of pollen is available. With insect pollination, the safe distance will depend on the abundance of insects and on how well they like the flowers.

Hume (1953) suggested that where space is limited, two holly trees, one male and one female, can be planted in the same hole. Alternatively, one male
branch can be grafted onto a female tree. Unfortunately, knowledge of how to graft branches is less widespread than at the time Hume wrote. Hume stated that one male holly tree could pollinate 10 female trees growing nearby, and the same is probably true of other tree species, such as persimmon. Regarding hollies, Hume states that “some staminate specimens produce a great abundance of flowers, while others have relatively few. In selecting a pollen-bearing variety, it is best to choose one that produces large numbers of flowers. Not only will it furnish more pollen, but its blooms will continue to open over a long period.” For pollination in commercial plantations of kiwifruit and oriental persimmon, specific male plants have been selected, named, and clonally propagated for use because of their copious pollen production.

Now that I have solved my yaupon problem, my next project will focus on coral honeysuckle (Lonicera sempervirens). This species has kept hummingbirds busy in my garden, visiting hundreds of red, tubular flowers, but it has never produced a single berry. I didn’t even know what kind of fruit honeysuckle was supposed to make. After visiting other native plant gardeners, whose coral honeysuckles were full of berries, I added another plant to my trellis. I hope this solves the problem.

Fruit and seed production are important if we want to maximize the environmental benefits of our native plantings. For the sake of our flora, propagators and planters need to do what is necessary to make their native plantings prolific producers of viable seed.

References

Darwin, Charles. 1859. The Origin of Species.

Dick Deuerling, Wild Food Specialist

Dick Deuerling, longtime FNPS friend and wild foods guru, passed away on July 18, 2013. He was 92 years old. A service was held in Orlando to honor his memory, with four generations of his family and many members of the FNPS Tarflower Chapter in attendance.

Dick was a self-taught naturalist who was interested in plants since he could crawl, and had eaten wild foods for fifty years. Teaching came naturally to him, and he shared his knowledge and experiences with many. He taught survival techniques to Boy Scout troops, and was proud that one of his proteges was the only scout to gain weight on a 153-mile, thirteen day survival hike across Florida.

He gave programs on wild foods to garden clubs, college students, and public school children. One group of youngsters at the Orlando Science Center were served a porridge of Jerusalem artichokes and sandspurs. Although they were not told what it was until after dining on it, they agreed it was good.

In 1989, FNPS introduced readers to Dick via his regular column in Palmetto, “Native Wild Foods”. Peggy Lantz, Editor of FNPS Palmetto from 1981 to 1995, wrote in her introduction to Dick’s new column, “Every Florida Native Plant Society chapter needs somebody like Dick Deuerling with the ongoing enthusiasm and knowledge that keeps a chapter alive and growing. Every month, Dick is on the program of the Tarflower Chapter in central Florida, sharing his expertise, showing wild plants he has brought to the meeting, and providing refreshments in the form of teas, jellies, and syrups made from wild native plants.”

The topic of Dick’s first column was elderberry, and over the next four years, he wrote 16 more columns on wild foods. These popular wild food columns were gathered together into a small 72-page illustrated book, officially presented at the 1993 FNPS conference in Haines City. The book, Florida’s Incredible Wild Edibles, has been reprinted numerous times, and is available online or from co-author Peggy Lantz.

Florida’s Incredible Wild Edibles
Richard Deuerling & Peggy Lantz

Florida’s varying habitats are blessed with a wide variety of native plant species, with roots, stems, leaves, flowers, fruit, and seeds that provide good and interesting food for people. From “Dandelion Dip” to “Elderflower Champagne,” the authors offer accurate descriptions and recipes for Florida’s incredible wild edibles.


Thanks to Peggy Lantz for providing a biographical sketch of Dick Deuerling
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and Representatives

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Volunteer needed for Okaloosa/Walton County area.

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