FLORIDA WILDFLOWER FOUNDATION

news from the FIELD

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Florida Wildflower Foundation Quarterly Newsletter
www.FlaWildflowers.org

Spring 2013

500 years of La Florida – Come celebrate with us!

The commemoration of 500 years of La Florida, land of flowers, is being observed throughout the state, and we're happy native wildflowers and plants – Florida's original flora – will be celebrated at many upcoming gatherings.

The largest of these events - the free Florida Wildflower & Garden Festival in DeLand – will be held from 9 a.m. to 3 p.m. March 23. DeLand Mayor Robert F. Apgar will kick off a day of demonstrations, presentations and fun with a La Florida proclamation. Festival presenters include Dr. Walter K. Taylor, who will introduce his new book, *Florida Wildflowers: A Comprehensive Guide*, and Dr. David Hall, author of *Wildflowers of Florida and the Southeast*. Vendors will offer native plants and wildflowers, garden equipment and decorations, local honey and more. A free shuttle will run between the festival and the DeLand Outdoor Art Festival. For more information, visit www.floridawildflowerfestival.com. Come and join us for the day on East Indiana Avenue.

Native plant sale at the FNPS annual conference.
See more events on Page 4.

In April, the inaugural Native Plant Show (April 4-5) and an accompanying native plant sale (April 5-6) will take place at Osceola Heritage Park Building in Kissimmee. Florida's first all-native plant wholesale trade show will feature 40 of the state's finest native plant growers showing off beautiful trees, palms, shrubs, vines, grasses and wildflowers. Many workshops are planned, with continuing education units available for landscape architects, designers, installers and arborists. The show also will feature demonstrations of Real Florida Landscapes™ and Florida-Friendly Landscaping™ best management practices training. For more information and to register, visit www.nativeplantshow.com.

At the Native Plant Show on April 4, the Foundation-sponsored Putting Wildflower Research to Work mini-symposium will present information on cultivating new-to-market species and installing wildflower plantings. Cost to attend is $25; three CEUs are available for Florida Nursery, Growers & Landscape Association Certified Professionals. For more information or to register, visit www.nativeplantshow.com/schedule/puttingwildflowerstowork.

Don't miss the native plant sale, which benefits the Florida Native Plant Society's Central Florida chapters. Get there early to get the best choices for your landscape.

Finally, please join us in Jacksonville May 16-19 for the Florida Native Plant Society's 2013 conference, "Celebrating La Florida; the Land of Flowers." The Florida Wildflower Foundation is a proud sponsor of FNPS' conference, which will include field trips to natural lands, presentations, a home landscape design workshop, a plant sale and much more. For details, visit www.fnps.org.

We hope to see you soon at one or more of these events!

Lisa Roberts
Executive Director

Enriching lives with Florida's native wildflowers

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Three grant programs open for applications

Three FWF grant programs are taking applications this spring:

- Seeds for Schools, which provides schoolteachers with wildflower seeds for campus gardens (apply through March 22)
- La Florida, Land of Flowers, Community Planting Grants, which awards $500 vouchers with which to purchase Florida native wildflower seeds or plants
- Viva Florida Landscape Demonstration Grants, which provides $3,000 of funding to botanical gardens, nature centers and public parks to help establish native wildflower demonstration gardens

The Florida Wildflower Foundation's planting program is the only one of its kind in Florida. Grants are made possible by the purchase and renewal of State Wildflower license plates. Visit www.FlaWildflowers.org/grants.php to learn more about our grants or to download planning documents.

Save the date!

The Florida Wildflower Foundation's annual Florida Wildflower Symposium will be held Sept. 28 at Brevard County's Enchanted Forest Sanctuary, Titusville. This year's event is presented in close partnership with Brevard's Environmentally Endangered Lands program and the Friends of the Enchanted Forest. The daylong celebration of Florida's native wildflowers, plants and wildlife will include field trips, guided hikes, workshops and presentations. There will be a native plant sale, too. As always, FWF members will receive a discount to attend. Become a member now at www.FlaWildflowers.org/membership.php.

Flower color polymorphism — surprise colors from your favorite plants *by Claudia Larsen*

Don't let the title scare you off! I've been wondering why plants of the same species sometimes occur in different colors, so I did a little research. As you can see from my photos, some common flowers that have appeared in my garden are red and yellow forms of milkweed (*Asclepias tuberosa*) and blanketflower (*Gaillardia puchella*). I also have red, pink and white tropical sage (*Salvia coccinea*), which I'm sure many of you have also grown. Do you ever have white flower forms of your typically blue spiderwort (*Tradescantia ohiensis*) or Stokes' aster (*Stokesia laevis*)? Wonder what's going on?

There are scientific papers that are the results of years of study, but I hope to shed a little light on the subject without having to pursue a new degree in molecular biology.

We know flowers are genetically coded for their primary colors, but variations in colors may also occur through a natural mutation of genes. For example, dark purple flowers may mutate to lighter purple, and seeds from those flowers may produce plants with flowers of various shades of purple. One of the commonest mutations in populations of plants with purple flowers is that they occasionally produce plants with white flowers. This mutation is almost never reversed, with white plants producing purple offspring.

As far back as Charles Darwin's time, pollinators were linked to flower color and shape, and until the 1970s, flower color variation was thought to be an adaptation for pollinator ecology. For instance, there are tubular red or orange flowers are pollinated by birds with elongated beaks, white-flowered plants that open at night for moth pollination, and bee-pollinated plants that are blue or purple, colors that seem to draw bees.

Bees are still considered an important factor in determining flower color and are a predominant consideration of the study of polymorphism. When they visit flowers, bees transfer pollen grains with genetic information to nearby plants of the same species. It has been shown that they may prefer certain colors. Experiments show bees avoid white flowers when these comprise less than 25 percent of the flower population, but this discrimination disappears when white flowers comprise 50 percent or more of the population. There is no discrimination among pink or blue flowers. (Bees may have difficulty detecting achromatic flowers like white, resulting in a preference for more easily seen colors that improve their foraging ability.) The white flowers that are not cross-pollinated end up being self-fertilized. This ensures reproduction but sometimes results in reduced vitality of the next generation plants due to inbreeding. My own observation confirms this when I compare my strong red salvia with the more fragile white-flowered salvia growing in the same garden space.

Blanketflower variations. Photo/Claudia Larsen

Pollinators, mutations, ecology

There are many factors that influence flower color advantage in reproduction, and we need more research to solve the mysteries. Plant scientists have compared natural selection vs. pollinator selection on columbine (*Aquilegia sp*), iris (*Iris sp*), phlox (*P. drummondii, P. pilosa*), beardtongue (*Penstemon sp*), cardinal flower (*Lobelia sp*) and others. These studies indicate there are many factors that influence flower color advantage in reproduction and that more research is needed to solve the mysteries.

If you are a curious gardener, try to observe the color of flowers most popular with bees. What other factors do you think might influence the bees' choice?

Current researchers do not discredit the importance of pollinators, but they now also view color variation as the effects of ecology and gene mutation caused by natural selection. Each flower species contains anthocyanin pigments that control flower color. These pigments, in turn, are controlled by genes. The fitness of the plant — described by flower number, seed number or biomass — also contributes to the puzzle.

Apparently, there are a lot of people who would also like to crack open the question of color variation in flowers. A literature search reveals dozens and dozens of papers from all over the world looking for answers in places as that range from plant morphology to genetic drift.

If you want to see how complex these studies can be — check out research from Duke University done on native Texas phlox (www.sbs.utexas.edu/kirkpatrick_lab/K/Robin_files/Hopkins%20et%20al_2012.pdf). The paper includes a study sampling native populations at 39 sites across southeast Texas. Flowers consisting of blue, red and their hues were counted, and 605 samples were returned to the lab, where DNA was extracted from leaf tissue. Each sample was genotyped at nine locations on the gene using DNA analyzers and gene-marking software. DNA was subsequently tested for genetic variation to differentiate populations by flower color. After exhaustive tests, statistics was used to compile data and form visual graphs of molecular signatures. The conclusion at the end of this three-year journey was that "natural selection with reproductive character displacement causes color variation, and not the alternative hypothesis of neutral drift and restricted gene flow."

Very interesting... but mind-boggling!

Purple and white Stokes' aster. Photo/Claudia Larsen

Peeking inside the plants

Getting down to the real nitty-gritty, you have to look at what's going on inside the plant (and I mean way inside). The advancements of molecular biology in plant science in the last two decades are unlocking the relationships between plant biology and the environment with new technologies that are helping to study the genes of flavonoid biosynthesis that control flower color.

Pathways — complex mapping systems that help scientists visualize and mark groups of chemicals found at specific locations in genes — are helping scientists unlock plant secrets, including those of anthocyanin pigments that are responsible for flower color. To study the anthocyanin pathway's role, scientists identify plant enzymes and trace side branches that control structural support, plant disease defense, UV protection, pollen viability, and color pigments. Enzymes influencing color have been identified as CHS (chalcone synthase) and DFR (dihydro flavonol), but due to the mobility of genes and multiple copies, it's been difficult to credit one gene for color variation.

According to researchers at the University of California, Riverside, flower color is determined by a regulatory gene in the anthocyanin pathway, rather than by one particular structural gene. More research is needed to identify this gene on the molecular level and to include it in the study of plant modeling systems, which is itself a new innovation. Modeling is a tool now commonly used for predicting weather and climate, soil and water interactions and natural resource management. But plant models are also being designed to help understand processes of plant growth and to forecast possible interactions by simulating different conditions like genetics and environmental impacts. Techniques of modeling assign geometric patterns and mathematical symbols to plant and environmental components to make predictions that cannot be adequately proven using known scientific methods.

As far as an answer to polymorphism, I'm sorry to disappoint, but the scientific jury is still out. The answer to color variation in our gardens may be due to genetic mutation, but the microbiologists will have to let us know in the next decade or so.

Until then, just enjoy the myriad color and textures of your wildflowers and revel in the complexity of nature.

Claudia Larsen is the Foundation's Seeds for Schools program administrator. She owns Micanopy Wildflowers, a nursery in Micanopy, Fla.

Rare Plant Conservation in Rights-of-Way *by Michael Jenkins*

There are more than 600 different rare plant species in Florida that are either regulated or tracked by state and federal agencies. Over a third are sun-loving, shade-intolerant plants (e.g., terrestrial orchids, lilies, pitcher plants, etc.) that can be found in the open habitat of roadsides and powerline/gasline rights-of-way (ROWs). Statewide, ROWs are one of the best places to find rare plants.

Mowing along rights of way can be a good thing — or bad — for endangered and threatened plants. Photo/Jeff Norcini

Why are they there? ROWs provide habitat open enough for these rare, shade-intolerant plants to survive. Many are species that are adapted to or dependent on fire and live in fire-maintained habitats such as wet prairies, sandhills or scrub. They have evolved in areas where Florida's heavy shrub and tree layers were regularly "cleaned up" with large-scale, lightning-caused fires, and those lighted by Native Americans and ranchers. For millennia, this created open, unshaded landscapes that let flowers/forbs, grasses, rushes and sedges thrive, resulting in a globally outstanding diversity of herbaceous plants.

The recent lack of proper fire management in most areas has let woody shrubs and trees dominate, so plants that were once common have become very rar, and must find refuge in the adjacent, more open ROWs. This is especially true in areas that are periodically mowed, which creates an open habitat like that of a fire-maintained landscape.

Would it be OK for these precarious, "unnatural" ROW rare plant populations to disappear? No. Chances are good that these populations are the last remaining individuals of the species in the area (maybe in the world). Should we just leave them be and let them try and persist into the future on the ROW? That would be a "no" too, if we are steadfast conservationists. Conservation genetics reveals that many of these roadside plant populations have lost genetic viability and population fitness (for a great number of reasons). They are slowly disappearing and need the help of knowledgeable botanists, plant rescuers, researchers and growers.

So what do we do when we encounter rare plants on ROWs? Get its latitude and longitude with a GPS device (noting the accuracy of the GPS and datum used) and record detailed directions. Note the status of the population (e.g., how many plants there are, if flowering/fruiting, encroached upon by shrubs, dug up by hogs, etc.), and submit the information to the Florida Natural Areas Inventory (the state Natural Heritage Program). If the plant is on a state or county road, you can also submit the information to the Florida Department of Transportation or county road department contact for the region in which the plant is located. You may also contact me for assistance.

If you want to help the plant more than just documenting it properly, seek permission to do so from the landowner. A face-to-face meeting with the private or public land owner is the best approach, as many letters sent to the landowners go unanswered. Then do some research on the plant's conservation needs and life history (which may or may not be known) so you can develop an educated conservation plan. The needed conservation of ROW populations are a site-by-site, species-by-species basis, necessitating a well-thought-out and well-documented plan of action. Each population, even if it is one individual, is important and in need of a unique conservation plan tailored to that single population.

Small efforts to help these plants can have immediate results. Removing vegetation such as shrubs and trees from around our sun-loving, ROW rare plants really helps! Even cutting a single tree limb or shrub shading the plant may increase flowering or germination of otherwise dormant seeds in the soil's seed bank. Tools include a pair of loppers, hedge trimmers, or pruning shears. Hand pruners fit into pockets (and come in handy when you are hiking through saw briars). One Atlanta Botanical Garden botanist is well-known for carrying pruners in the field during research and doing opportunistic, small-scale vegetation removal around rare plants, especially pitcherplants and terrestrial orchids.

In summary, the best method of conserving our hundreds of ROW rare plants species is to look at each species individually, determine their current status and future conservation needs, make a plan to conserve them, and see that plan through. They may be "sticking it out" in a ROW, waiting for a plant conservationist's hand to help them continue their long journey through the millennia, living in the Sunshine State.

Michael Jenkins is a Plant Conservation Biologist with the Florida Forest Service in Tallahassee. Contact him at Michael.Jenkins@FreshFromFlorida.com.

Rare plant lists

- A list of Florida's federal-listed plants can be found on the Florida Forest Service, Florida Statewide Endangered and Threatened Plant Conservation Program website: www.floridaforestservice.com/forest_management/plant_conserve_list.html
- The author of this article works with this program and has a list of federal, state, and FNAI tracked plant species with additional attributes. This list was spatially digitized by county and is available upon request. Michael.Jenkins@FreshFromFlorida.com
- The Regulated Plant Index with state-listed plants is maintained by the Florida Department of Agriculture and Consumer Services, Division of Plant Industry www.flrules.org/gateway/ChapterHome.asp?Chapter=5B-40
- The Florida Natural Areas Inventory is the Florida's Natural Heritage Program. Its tracking list of rare plants and other species can be found at www.fnai.org/trackinglist.cfm (Note: Not all state-listed plants are tracked by FNAI, although all federal species are).
- University of South Florida's Institute for Systematic Botany, comprehensive search engine for listed plants (for counties with vouchered specimens only) florida.plantatlas.usf.edu/search.aspx

Submit rare plant data to:

- Florida Natural Areas Inventory (Florida State University, Geography Dept.) www.fnai.org/fieldreportingforms.cfm
- Florida Department of Transportation District contacts for state roads and highways www.dot.state.fl.us/publicinformationoffice/moreDOT/districts/district.shtm

For Florida rare plant-life history information:

- Archbold Biological Station – specializes in Lake Wales Ridge rare plant life histories www.archbold-station.org/
- Atlanta Botanical Garden - statewide, life histories, especially native and rare orchids and pitcherplants www.atlantabotanicalgarden.org/conservation/native-plants
- Bok Tower Gardens - statewide work conserving rare plants and researching their life histories boktowergardens.org/conservation/
- Fairchild Tropical Botanical Garden - Species information/conservation action plans www.fairchildgarden.org/centerfortropicalplantconservation/speciesandhabitatconservation/speciesweworkwith/
- Florida Forest Service, Florida Statewide Endangered and Threatened Plant Conservation Program www.floridaforestservice.com/forest_management/plant_conservation_index.html (go to "List of Program Reports by Species (pdf)" on the right portion of page)
- Insititute for Regional Conservation-South Florida rare plant conservation research www.regionalconservation.org/
- Key West Tropical Forest and Botanical Garden-Florida Keys and South Florida rare plant life history kwbgs.org/page.asp?p=contact

Also contact local college and university biological departments and herbariums, Florida Native Plant Society chapters, and local preserves owned by the Florida Park Service and The Nature Conservancy.

Welcome new members

(r) – renewal

General

Ann Bassett-Hite
Mark Hutchinson (r)
Emily Jane Murray
Melissa Ferguson
Nancy Lambert
Stephanie Windham
Florida Federation of Garden Clubs (r)

Student / Senior

Joel Jackson
Joan Rothrock (r)

Business/Contributor

Florida Native Plant Society, Ixia Chapter
William Mitchell

License Tag

Debra Bruce
John Dolan
Norma Emerson
Chris Gee
Sandra Vanno

Reconfirmed License Tag

Daniel Cooke
Donna Deal
Mary Frances Lawrie
Terri and Marc Godts / Green Isle Gardens

Donations needed

FWF is in immediate need of office equipment, including desks, office chairs, personal computers (Windows Vista or 7 preferred), bookcases and file cabinets. The Foundation is a 501(c)3 not-for-profit corporation, and your donation may be tax deductible. We will be glad to furnish you with a letter acknowledging your donation. If you can help, please contact Lisa Roberts at 407-353-6164 or LRoberts@FlaWildflowers.org. Rather give a monetary donation? Visit www.FlaWildflowers.org/donate.php.

Calendar

March 23: Florida Wildflower & Garden Festival, DeLand

April 4-5: Florida Native Plant Show, Kissimmee

April 4: Putting Wildflower Research to Work mini-symposium, Kissimmee

April 5–6: Central Florida Native Plant Sale, Kissimmee

April 5–6: CREW Wildflower Festival, Immokalee

April 7: Butterfly Migration, St. Marks

April 13: Wildflowers and Wildlife of Tate's Hell State Forest, Franklin County

April 13: PEAR Park Native Plant Sale, Leesburg

May 6–10: National Wildflower Week

May 9: Florida's Fabulous Wildflowers, Orlando

May 16–19: FNPS Conference: Celebrating La Florida, 'Land of Flowers,' Jacksonville

June 2: Planting a Refuge for Wildlife, St. Marks

Visit FlaWildflowers.org/news.php for full calendar and event details.

Thank you to our volunteers

FWF is grateful to the following individuals and organizations for filling thousands of wildflower seed packets for distribution all over the state:

Melissa Ferguson
Sparkleberry Chapter, Florida Native Plant Society
Guana Tolomato Matanzas National Estuarine Research Reserve
St. Petersburg Garden Club
Art Guild of Orange Park
Florida Department of State, Division of Library and Information Services

And thank you to these volunteers, who recently gave their time to review and update our strategic plan:

Terry L. Zinn
Vince Lamb
Carolyn Schaag
Gary Henry
Jeff Caster
Anne Mackay
Nancy Bissett
Michael Gilkey
Donna Torrey
Chad Washburn
Kim Coker
Walter K. Taylor
J.R. Newbold
Claudia Larsen
Brightman Logan

Want to become a FWF volunteer? For upcoming opportunities, contact Lisa Roberts, 407-353-6164 or LRoberts@FlaWildflowers.org.

Join a movement that's growing like wildflowers!

Over the last decade, our members have raised more than $2.6 million for Florida's native wildflowers and grasses through their membership dues and donations made through the State Wildflower license plate. By doing so, they've helped seed highways, fund community plantings, create educational materials, support important research projects, and much more.

By becoming a Florida Wildflower Foundation member, you can join the fight to preserve and conserve Florida's native wildflowers, too. To join, use the convenience of PayPal online at www.FlaWildflowers.org/membership.php or snip out this membership coupon to send with a check. Got a Florida State Wildflower license plate? Your membership is free!

Your name (please print)

Address

City State Zip Code

Area code and phone number

Email

❑ New Member ❑ Renewing Member

Check one:

__ Student/Seniors, $15
__ General, $25
__ Contributor/Business $100
__ Sustaining, $250
__ License tag: I'm a State Wildflower license tag holder, which entitles me to a free membership (specify Tag No. and Expiration date)

Please make check payable to Florida Wildflower Foundation Inc.

Send to:
Florida Wildflower Foundation
P.O. Box 941066
Maitland, FL 32794-1066

or visit www.FlaWildflowers.org/membership.php

Show your Flower Power — get the plate!