EXOTICS ON THE RUN
Leveling the playing field for native plants

Florida Exotic Pest Plant Council (FLEPPC) Annual Symposium ● May 17-20, 2011
A joint symposium with
Florida Native Plant Society Conference ● May 19-22, 2011
Sheraton Orlando North Hotel, Maitland, FL

Full symposium information at www.fleppc.org
**Tuesday, May 17th**

**Florida EPPC Board of Directors & Task Force Meetings**
1:00 PM – 4:00 PM, Pegasus Room

**Symposium Early Registration**
1:00 – 6:00 PM, Hallway in front of Phoenix Room

**Wednesday, May 18th**

**Symposium Registration**
7:30 AM – 3:00 PM, Hallway in front of Phoenix Room

**Vendor Expo**
8:00 AM – 5:00 PM, 6:00 – 8:00 PM, Orion/Atlas and Phoenix Rooms
Many companies in the invasive plant management industry will demonstrate their products and services.

**Chair’s Welcome Address**
8:20 – 8:40 AM, Galaxy IV Ballroom
Florida EPPC Chair, Jim Burch

**Keynote Address**
8:40 – 9:40 AM, Galaxy IV Ballroom

**Natural History Meets Human History: Weeds Tell a Tale**
Deborah Green, Ph.D., Author, Educator and Member of the Florida Native Plant Society

This year’s keynote speaker is Dr. Deborah Green, Deborah Green earned her Ph.D. in entomology from University of California, Berkeley, working with the Biological Control Group, which worked on the introduction of insect predators on invasive exotic plants.
An environmental science instructor for the past 23 years, she has written 3 natural history books on Central Florida preserved areas. These self-published books of the mid to late 1990s were pioneering works interpreting ecological information, in the days before the Internet. FNPS member since 1987, she is the state representative for the Cuplet Fern Chapter.

**Session I: Early Detection / Rapid Response**
9:40 – 10:20 AM, Galaxy IV Ballroom
*Session Moderator: Jim Burch, National Park Service*

9:40 – 10:00 AM **Best Management Practices for Early Detection / Rapid Response Species** Alison Higgins

10:00 – 10:20 AM **Everglades CISMA Rapid Response to Lumnitzera racemosa and Mikania micrantha in Miami-Dade County** Dennis Giardina, Tony Pernas, Jennifer Possley and Jane Griffin-Dozier

10:20 – 10:40 AM **Refreshment Break provided by Aquatic Plant Management, Inc.**
Wednesday, May 18th

Note: Session II and Session III are concurrent sessions from 10:40AM to noon.

Session II: Cooperative Invasive Species Management Area Panel Discussion
10:40 AM - 12:00 PM, Galaxy II & III
Session Moderator: Erin Myers, US Fish and Wildlife Service

10:40 AM - 12:00 PM Long Live the CISMA! Sustaining and Strengthening Cooperative Invasive Species Management Areas (CISMAs) in Florida Kristina Serbesoff-King and Erin Myers

Session III: Green Roofs and Pesticide Certification Preparation
10:40 AM - 12:00 PM, Galaxy IV
Session Moderator: Todd Olson, Aquatic Vegetation Control, Inc.

10:40 - 11:00 AM Florida Green Roofs, The New Frontier for Invasive and Exotic Species Kevin Songer
11:00 AM – 12:00 PM General Certification Standards Exam Preparation Ken Gioeli

Lunch 12:00 PM – 1:00 PM

Session IV: Invasive Plant Management and Regulation
1:00 – 2:20 PM, Galaxy IV
Session Moderator: LeRoy Rodgers, South Florida Water Management District

1:00 - 1:20 PM Search for New Management Techniques for Hydrilla and Hygrophila Stacia Hetrick and Dean Jones
1:20 - 1:40 PM Fire and Exotic Plant Management in Southern Florida James Burch
1:40 - 2:00 PM New Projects for Bugwood 2011 Karan Rawlins and Chuck Bargeron
2:00 - 2:20 PM You Want to Plant What for Biomass – Regulation, Research and Reason in Considering Weed Potential of Energy Crops Kenneth Langeland
2:20 - 2:40 PM Refreshment Break provided by Alligare, LLC.

Workshops 2:40 – 5:00 PM

Lygodium, Lygodium – What are we to do with you? Galaxy IV
Led by Rosalind Rowe, The Nature Conservancy and LeRoy Rodgers, South Florida Water Management District
This is a workshop to present recent research and experiences around controlling the invasions of Lygodium japonicum and Lygodium microphyllum in Florida. A combination of short presentations and open discussions will provide a forum for sharing our efforts, and evaluating where we are with respect to our battles with these plants and how we might best plan our next steps. There will be an exchange of anecdotal and research experiences, with news from the field from many who have been taking on the day-to-day work, so everyone who works with these ferns is invited to
Wednesday, May 18th

participate. We’ll hear about experiences with impacts from varying water levels, varying temperatures, chemical resistance issues, and seasonal management. Topics such as prevention, vector studies and decontamination also will be addressed.

Natural Areas Weed Management Preparation Class Galaxy II & III
Led by Ken Gioeli, University of Florida/IFAS
Individuals planning to take the Natural Areas Weed Management Certified Pesticide Applicator examination should attend this three-hour training session. Participants will receive an overview of pest plants and their recommended chemical controls, a review of chemical control methodologies, herbicide characteristics and their behavior in the environment, and methods for herbicide dilution and rate calculations. Limit 30 participants.

Poster Session
6:00 – 10:00 PM, Hallway near lobby

Evening Social Event
6:00 – 10:00 PM, Hallway outside of Galaxy Rooms sponsored by Aquatic Plant Management, Inc.

Thursday, May 19th

Vendor Expo
8:00 AM – 12:00 PM, Orion/Atlas and Phoenix Rooms

Track 1 Note: There are two concurrent sessions on Thursday morning.

Session V: Biological Controls
8:20 – 10:00 AM, Galaxy II & III
Session Moderator: Mike Bodle, South Florida Water Management District

8:20 – 8:40 AM Biological Control of Brazilian Pepper: Results from Foreign Exploration and Host Testing Greg Wheeler, Fernando McKay, Marcelo Vitorino and Dean Williams

8:40 – 9:00 AM Biology and Preliminary Host Range of Paectes obrotunda (Lepidoptera: Noctuidae), a Potential Biological Control Agent of Brazilian Peppertree Veronica Manrique, Rodrigo Diaz and William Overholt

9:00 – 9:20 AM Delivering the Goods: Technology Transfer of the Tropical Soda Apple Biological Control Program Rodrigo Diaz, William Overholt, Ken Hibbard, Ken Gioeli and Julio Medal

9:20 – 9:40 AM Biological Control of Chinese Tallow: Results from Foreign Exploration and Host Testing Greg Wheeler, Sedonia Steininger, Susan Wright and Jianging Ding
9:40 – 10:00 AM **Update on a Promising Biological Control Agent for Brazilian Peppertree: the Stem Boring Weevil Apocnemidophorus pipitzi (Coleoptera: Curculionidae)** James Cuda, Judy Gillmore, Julio Medal, Bolivar Garcete-Barrett and William Overholt

10:00 – 10:20 AM **Refreshment Break provided by Brewer International**

**Session IV: Restoration**

10:20 – 11:20 AM, Galaxy II & III
Session Moderator: Mike Bodle, South Florida Water Management District

10:20 – 10:40 AM **Restoring Abandoned Citrus Groves: Reducing Biotic and Abiotic Barriers to Native Plant Establishment** Annalisa Weiler and Betsy Von Holle

10:40 – 11:00 AM **Cover and Richness of Native Vegetation Two Years Following Herbicide Treatment of Japanese Climbing Fern in Bottomland Hardwood and Longleaf Pine Forests of the Florida Panhandle** Kimberly Bohn, Patrick Minogue, Corrie Pieterson and Justin McKeithen

11:00 – 11:20 AM **Restoration Strategies Following Cogongrass Removal in Reclaimed Phosphate Mines** Greg MacDonald, Kathryn Villazon and Carrie Reinhardt-Adams

11:20 – 11:40 AM **Field Trip Logistics**, Galaxy II & III

**Track 2**

**Session VII: Natives vs. Invasives**

8:20 – 10:00 AM, Galaxy IV
Session Moderator: Kenneth Langeland, University of Florida

8:20 – 8:40 AM **Weed or Wildflower?** Linda Duever

8:40 – 9:00 AM **Marsilea Ferns (water clover): Endemism and Invasion in Florida** Colette Jacono, W. Mark Whitten and Kenneth Langeland

9:00 – 9:20 AM **An Update on Phragmites in Florida** William Overholt, Dean Williams, Megan Hanson, Rodrigo Diaz and Veronica Manrique

9:20 – 9:40 AM **Hybrid Vigor for the Invasive Exotic Brazilian Peppertree (Schinus terebinthifolius Raddi., Anacardiaceae) in Florida** John Geiger, Paul Pratt, Greg Wheeler and Dean Williams

9:40 – 10:00 AM **Do Native and Nonnative Species Respond the Same to Climate Change?** Betsy Von Holle

10:00 – 10:20 AM **Refreshment Break provided by Crop Production Services**
**Thursday, May 19th**

**Session VIII: Lygodium Research**
10:20 – 11:20 AM, Galaxy IV
*Session Moderator: Rosalind Rowe, The Nature Conservancy*

10:20 – 10:40 AM **Effects of Metasulfuron and Prescribed Fire for Control of *Lygodium microphyllum* on Tree Islands in the A.R.M. Loxahatchee N.W.R.** Jeffrey Hutchinson and Kenneth Langeland

10:40 – 11:00 AM **Biological Control of Old World Climbing Fern, *Lygodium microphyllum*, by the Brown Lygodium Moth, *Neomusotima conspurcatalis*** Anthony Boughton and Ted Center

11:00 – 11:20 AM **Tolerance of *Lygodium microphyllum* and *L. japonicum* Spores and Gametophytes to Freezing Temperature** Jeffrey Hutchinson and Kenneth Langeland

11:20 – 11:40 AM **Field Trip Logistics**, Galaxy II & III

**Field Trips 12:00 – 6:00 PM**

**Geneva Wilderness Area** – *Led by LeRoy Rodgers*

The Geneva Wilderness Area is a 180 acre site that lies to the south of Geneva, on SR 426 in East Seminole County. The Geneva site contains an array of native Florida plant communities from Mixed Hardwood Swamp and Mesic Hammocks to scrubby flatwoods and scrub, all supporting an equally diverse collection of flora and fauna. A hike through these habitats can reward visitors with sighting gopher tortoise, white-tailed deer, wild turkey, grey fox, pennyroyal, tarflower, green-fly orchid, and vanilla plant.

The property is also plagued with invasive exotic species such as Chinese tallow, air potato, and coral ardisia. A series of experimental plots to study the effect of various treatment methods on Chinese tallow have been established. The field trip will focus on these plots, however there will be a short program on the Seminole County Natural Lands Program and the opportunity to hike the property.

Special Concerns: There are restrooms on site. Don't forget water, sun screen, snack and hat. Please bring optional binoculars & cameras. Light, long-sleeved shirt and pants are recommended to protect against sun and biting insects. You may get muddy.

**Wekiwa Springs State Park** – *Led by Tony Pernas*

Wekiwa Springs State Park is a jewel of the Florida State Park system. Located just north of Orlando, the 7,800 acre park contains 19 plant communities from wet floodplain swamp to dry sand hills and scrub. The park has more than 50 listed species. In addition they have a renowned prescribed fire program. Join us on this trip to see how biologists manage invasive exotic species across a diverse landscape.

Special Concerns: There are restrooms on site. Don't forget water, sun screen, snack and hat. Please bring optional binoculars & cameras. Light, long-sleeved shirt and pants are recommended to protect against sun and biting insects. You may get muddy.
Green Swamp Lodge – Led by Rosalind Rowe
This 1600-acre private property is managed for fishing, hunting, and outdoor enjoyment, and portions of the property have been put under USFWS Partners for Wildlife protections. Large sections of the property were once associated with sand mining operations during a time when such mines would dump unwanted tailings into neighboring wetlands; these tailings appear to be high in clay content and to provide an excellent germination base for Lygodium. This property was discovered to have infestations of both climbing ferns on it in late 2005, and The Nature Conservancy, through its Central Florida Lygodium Strategy funds, has been working since then, with active support and participation by the Green Swamp Lodge lands manager, to control these plants. This has not been easy - and we will be looking at the soils and consider the variety of techniques that have been applied, including aerial and ground herbicide applications, disking, burying under sand, and burning before treating.

Special Concerns: There are restrooms on site. Don’t forget water, sun screen, snack and hat. Please bring optional binoculars & cameras. Light, long-sleeved shirt and pants are recommended to protect against sun and biting insects. You may get muddy.

FLEPPC/FNPS Symposium Reception, 6:00-10:00PM, Antobar Irish Pub inside hotel

Friday, May 20th

Session IX: Invasive Species Assessment & Management
8:20 – 10:00 AM, Galaxy II & III
Session Moderator: Karen Brown, University of Florida

8:20 – 8:40 AM Accuracy of a Modified New Zealand Aquatic Weed Risk Assessment for the U.S. Doria Gordon, Crysta Gantz, Christopher Jerde and W. Lindsay Chadderton

8:40 – 9:00 AM Aerial Surveys of Invasive Plants on the Lake Wales Ridge – Limitations, Lessons Learned and Lots of Value  Cheryl Millett, Clarence Morgan and Tabitha Biehl-Gabbard

9:00 – 9:20 AM The Central Florida Lygodium Strategy: Cultivating Landscape-scale Invasive Plant Management  Rosalind Rowe


9:40 – 10:00 AM The University of Northwest Florida IFAS Extension District: It's Expanding Role Educating Private Landowners about Invasive Species Management Judy Ludlow

10:00 – 10:20 AM Refreshment Break provided by Winfield Solutions
FLEPPC Business Meeting and Awards 10:20 – 12:00 AM, Galaxy II & III
Note: General membership is encouraged to attend! Come vote for the 2011/2012 Board of Directors.

Symposium Adjourns, 12:00 PM

Natural Areas Weed Management Examination - 1:30 PM – 3:00 PM, Hercules Room

**Door Prizes**
Door prizes will be given away at the beginning of each session

Special thanks to our symposium sponsors!

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Get involved with FLEPPC

We need your help! FLEPPC cannot fulfill its mission without the direct involvement of its members. Several committees are now in need of assistance. Contact a symposium organizer to find out about volunteer opportunities. Please volunteer today!

FLEPPC symposium organizers

Chuck Barger—Web Master
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Dan Bergeson—Vendor Liaison
Jessica Spencer—Program Chair
Dianne Owen—Registration
Tony Pernas—Merchandise
Ben Gugliotti—Field Trip Coordination

Hotel Information

Sheraton Orlando North
600 North Lake Destiny Drive
Maitland, FL 32751 USA
Phone: 407-660-9000

Points of Interest

Disney Theme Parks
About 25 miles south on I-4

SeaWorld
7007 SeaWorld Drive, Orlando, FL

Wekiwa Springs State Park
1800 Wekiwa Circle, Apopka, FL
Driving Directions

From Jacksonville:
-I-95 South to I-4 West
-I-4 West to Exit 90 - Maitland Blvd West
-Turn Right at the 1st Light - Lake Destiny Dr.
-Hotel is on the Right

From Miami:
-Take FL Turnpike North to Exit 259 - I-4 East
-Take I-4 East to Exit 90B - Maitland Blvd. West
-Turn Right at the 1st Light - Lake Destiny Dr.
-Hotel is on the Right

From Tampa:
-Take I-4 East to Exit 90B - Maitland Blvd. West
-Turn Right at the 1st Light - Lake Destiny Dr.
-Hotel is on the Right

From Gainesville/Tallahassee:
-Take I-75 South to the FL Turnpike (toll)
-Take FL Turnpike South to State Road 408
-Take State Road 408 East to I-4 East
-Take I-4 East to Exit 90B - Maitland Blvd. West
-Turn Right at the 1st Light - Lake Destiny Dr.
Oral Presentations

Cover and Richness of Native Vegetation Two Years Following Herbicide Treatment of Japanese Climbing Fern in Bottomland Hardwood and Longleaf Pine Forests of the Florida Panhandle.
Bohn1, Kimberly, Patrick Minogue2, Corrie Pieterson3, and Justin McKeithen1
1The University of Florida, Milton, FL; 2The University of Florida, Quincy, FL; 3Ohio State University, Columbus, OH

Herbicide treatments can be an effective management tool for controlling invasive species, but could be problematic where the invasive species intermingles with native vegetation. This is typical of Japanese climbing fern (Lygodium japonicum), a non-native vine that invades and intermingles with ground cover in a variety of forest ecosystems throughout Florida. The objectives of this study were to evaluate the efficacy of chemical control on Japanese climbing fern and to evaluate impacts to non-target, native groundcover. We tested the effects of glyphosate, imazapyr, and metsulfuron methyl at three rates and in combination in two bottomland hardwood forests and one longleaf pine forest in northwest Florida. We measured percent cover of Japanese climbing fern on 3 x 3 m treatment plots prior to and up to two years after treatment. Species composition and cover of native vegetation were recorded on two 1 x 1 m subplots at the same time. ANOVA with orthogonal contrasts was used to compare percent cover reduction of Japanese climbing fern and change in cover, species richness, and diversity of native species among treatments. One year after herbicide application, control of Japanese climbing fern ranged from 84-99% across all sites, and there was no statistical difference between treatments. By year two, substantial fern regrowth occurred on plots treated with imazapyr or metsulfuron methyl alone, sometimes resulting in greater cover than pre-treatment measurements. Only glyphosate alone or in combination resulted in significantly higher control (88-99%) at that time. In bottomland hardwood forests, change in cover of native plant groups was not influenced by treatment except for one location where graminoid cover increased 1 yr after metsulfuron-methyl treatment. There was no change in richness or diversity here. In the longleaf pine forest, change in total cover of native vegetation was significantly correlated with change in fern cover two years after treatment. Cover increased by 10% on plots treated with glyphosate alone or in combination, which was significantly greater than the 2-15% decrease on control and imazapyr-treated plots. At two years, species richness increased by 3-5 species on plots treated with glyphosate alone or in low-rate combinations and by 0-1 species on other treatments; however, there was no significant change in diversity indices by treatment. Though glyphosate is a broad-spectrum herbicide, the greater increases in cover and richness on those plots can be attributed to the additional space and resources available after more thorough control of the invasive fern.

Biological Control of Old World Climbing Fern, Lygodium microphyllum, by the Brown Lygodium Moth, Neomusotima conspurcatalis.
Boughton1, Anthony and Ted Center1
1USDA-ARS Invasive Plant Research Lab, Fort Lauderdale, FL

Old World climbing fern, Lygodium microphyllum is one of the most problematic invasive weeds impacting natural areas in southern and central Florida. Management has proven difficult and expensive, which prompted interest in the development of biological control options. The brown lygodium moth, Neomusotima conspurcatalis was the first biological control agent to establish field populations in Florida. Following its initial field release in 2008, the moth rapidly developed large populations and caterpillars caused substantial defoliation of lygodium that reduced ground cover by
about 50 percent. As populations of the moth have fluctuated over recent years, some re-growth of
lygodium has occurred, although data from December 2010 showed that ground cover of lygodium
along 12 transects in Martin County was still lower than levels present before the agent was
released. *Neomusotima conspurcatalis* is a tropical insect and populations are substantially reduced
during Florida’s cool winter season, which affords a period in spring and early summer when
lygodium can grow in the absence of caterpillar feeding pressure. Moth populations increase during
late spring and by late summer, caterpillars in zones of population outbreak may reach densities of
4000-16000 caterpillars per square meter of foliage, which causes complete defoliation and
significant suppression of lygodium. Parasitic wasps were first recovered from field-collected
*Neomusotima* caterpillars in fall 2008 and since that time parasitism rates have fluctuated from near
zero to peaks of 20 to 34 percent. Despite these apparently high rates of parasitism, *Neomusotima*
densities in fixed quadrats during fall 2010 averaged 140 caterpillars per square meter with average
maximal densities of 2400 larvae per square meter, which was comparable to an average fixed
quadrat density of 350 larvae per square meter recorded at the same sites during fall 2008. Results
collected to date suggest that the brown lygodium moth is capable of contributing to suppression of
Old World climbing fern in south Florida.

**Fire and Exotic Plant Management in Southern Florida.**
Burch¹, James
¹Big Cypress National Preserve, Ochopee, FL

For at least two decades Big Cypress National Preserve (BICY) has maintained an aggressive and
successful program to eliminate and control non-native plants. Similarly, BICY Fire Management has
led the National Park Service in acres burned during prescribed fire management. Fire can be a
valuable tool for managing invasive plants, but the biology of the exotic and its surrounding living
community should be considered. Depending on the nature of the invasive exotic and the ecology of
the surrounding area, fire may release or inhibit the plant’s invasive properties. Here we look at two
different exotics that produce significant compromises to southern Floridian biological communities,
techniques used for their management, the effects of fire on these plants, and possible methods for
integrating prescribed fire with exotic plant control.

**Update on a Promising Biological Control Agent for Brazilian Peppertree: the Stem Boring
Weevil *Apocnemidophorus pipitzi* (Coleoptera: Curculionidae).**
Cuda¹, James, Judy Gillmore¹, Julio Medal¹, Bolivar Garcete- Barrett² and William Overholt³
¹University of Florida, Gainesville, FL, ²Federal University of Parana, Curitiba, Parana, Brazil, ³University of Florida/IFAS
Biological Control Research & Containment Lab, Fort Pierce, FL

Brazilian peppertree, *Schinus terebinthifolius* Raddi (Anacardiaceae), was introduced into Florida,
USA, from South America as an ornamental in the 1840s. It eventually escaped cultivation and has
become a serious threat to the state’s biodiversity, especially over large areas of the Everglades. In
the 1980s, this invasive weed was targeted for classical biological control because of the extent of
the infestation and the absence of native congeners in the continental USA. In March 2006, a survey
for new natural enemies of Brazilian peppertree was conducted in southeastern Paraguay. A stem
boring weevil identified as *Apocnemidophorus pipitzi* (Faust) was collected from the plant at several
locations. The insect also has been reported from Argentina, Brazil and Uruguay. Adults are
defoliators and feed mainly on the upper surface of subterminal leaflets, where they produce a
characteristic notching pattern. Weevils were transported under permit to the Florida Biological
Control Laboratory in Gainesville, FL. A laboratory colony of *A. pipitzi* was established in April 2007
by caging the adults on cut branches of Brazilian peppertree supplemented with leaf bouquets. This
insect is the first stem borer of Brazilian peppertree successfully reared under laboratory conditions.
To date, over nine generations of the weevil have been produced in the laboratory, with over 10,000
adults emerging in the fifth generation. Females deposit eggs singly inside the stems and larvae
feed under the bark where they damage the vascular cambium. There are five instars, pupation also
occurs inside the stem, and a new generation occurs in 3-4 months. Host specificity tests were
conducted with 77 plant species in 39 families and 7 orders. The results showed that *A. pipitzi* can
reproduce only on Brazilian peppertree and the congeneric Hardee peppertree, Schinus polygamus (Cav.) Cabrera, which is invasive in California. The results of laboratory host range tests indicate that A. pipitzi is a Schinus specialist. A petition to release this insect in Florida for classical biological control of Brazilian peppertree is in preparation.

**Delivering the Goods: Technology Transfer to the Tropical Soda Apple Biological Control Program.**

Diaz1, Rodrigo, William Overholt1, Ken Hibbard2, Ken Gioeli1, and Julio Medal3

1University of Florida/IFAS Biological Control Research & Containment Lab, Fort Pierce, FL, 2Florida Department of Agriculture and Consumer Services, 3University of Florida, Gainesville, FL

A collaborative effort among federal, state and county agencies facilitated successful implementation of the biological control program against tropical soda apple (TSA) (Solanum viarum Dunal) in Florida. Mass releases of the leaf feeding beetle Gratiana boliviana Spaeth throughout Florida started in 2003 and initially targeted regions with large infestations of TSA. Beetles were hand-carried to release sites or mailed to land managers who were often directly involved in the release and initial data collection, including 1) the size of the TSA infestation, 2) geographic coordinates, 3) release date, and 4) number of beetles released. Field evaluation showed that feeding damage by the beetle has resulted in a reduction of TSA densities in central and south Florida. Since the inception of the biological control program, several methods were used to exchange information with stakeholders. Mail surveys reached thousands of ranchers to assess their perception about TSA infestations at the initial stages (2006) and after the biological control program (2010). Non-technical publications including how-to manuals, brochures, websites, articles in trade magazines, and fact sheets were used to transfer information to ranchers and extension agents. In addition, YouTube videos were produced to deliver information to a broader audience about the identification of the plant, recognition of beetle damage and a rancher’s perspective on beetle impact. Numerous scientific publications were prepared on various aspects of the biology, ecology and distribution of G. boliviana, and its impact on TSA density. The collaborative efforts and close communication among stakeholders, extension agents and scientists were critical during the technology transfer of this program, which can serve as a model for other invasive plant programs.

**Weed or Wildflower?**

Duever1, Linda

1Conway Conservation, LLC, Micanopy, FL

This presentation reviews issues raised in preparation of a “Weed or Wildflower?” flyer funded through FLEPPC’s Kathy Craddock Burks Education Grant. The flyer, which will be distributed as a handout, explains the difference between flowers genuinely native to Florida and exotics promoted as “wildflowers”. The origins and characteristics of the species considered will be discussed, as will the reasons for featuring those named in the flyer. The project’s goal was to produce educational material that would get native/non-native and invasive/non-invasive distinctions across to the gardening public, while addressing “grey areas” in a way that FLEPPC, the Florida Federation of Garden Clubs, and the member organizations of the Florida Native Plant Partnership could all accept. These organizations include the Florida Wildflower Foundation, the Association of Florida Native Nurseries, the Florida Native Plant Society, and the Florida Wildflower Growers’ Cooperative. This presentation will identify areas of agreement and disagreement between experts and organizations and describe the consensus-building process. It will explain how plants are categorized as “native” vs. “alien” or “exotic” and what the terms “invasive” and “weedy” mean. Several new terms from Strategic Vegetation Management (SVM)™ will also be defined: seedweed, nativasive, placeholder plant, and weed of choice. Other topics to be addressed include the importance of considering ecotypes and genetic diversity in seed selection. The presentation will include both basic information valuable to beginning gardeners and insights relevant to the work of professional land managers and biologists.
Hybrid Vigor for the Invasive Exotic Brazilian Peppertree (*Schinus terebinthifolius* Raddi., Anacardiaceae) in Florida.
Geiger¹, John, Paul Pratt¹, Greg Wheeler¹, Dean Williams²
¹ USDA/ARS Invasive Plant Research Laboratory, Ft. Lauderdale, FL, ²Texas Christian University, Fort Worth, TX

How can successful invaders overcome reduced genetic variation via small founder population sizes to persist, thrive, and successfully adapt to a new set of environmental conditions? An expanding body of literature posits hybridization, both inter- and intraspecific, as a driver of the evolution of invasiveness via genetic processes. We studied Brazilian peppertree (*Schinus terebinthifolius*), a tree species native to South America that is a successful invader throughout Florida. The tree was introduced separately to the east and west coasts of Florida over 100 years ago from genetically distinct source populations. We conducted a common garden experiment to compare the early life stage performance of hybrids versus their progenitors. We hypothesized that hybrids would outperform their progenitors due to the positive genetic effects of intraspecific hybridization (i.e. hybrid vigor). Hybrid seeds germinated at higher rates than eastern seeds. Over the eight month experiment, a greater proportion of hybrid seedlings survived than western seedlings and hybrids attained greater biomass than the western types. The cumulative hybrid advantage of both seed germination and seedling survival lead to the establishment of nearly 45% more hybrid seedlings versus either progenitor. Documenting fitness advantages for hybrids over their progenitors is a requisite finding to consider hybridization as a factor in the success of invasive species.

Everglades CISMA Rapid Response to *Lumnitzera racemosa* and *Mikania micrantha* in Miami-Dade County.
Giardina¹, Dennis, Tony Pernas², Jennifer Possley³ and Jane Griffin-Dozier⁴
¹Florida Fish and Wildlife Conservation Commission, Naples, FL, ²National Park Service, Palmetto Bay, FL, ³Fairchild Tropical Botanic Garden, Coral Gables, FL, ⁴Miami-Dade County Park & Recreation, Miami, FL

In 2008 and 2009, two new, aggressively-invasive plant species were identified in Miami-Dade County. The first, *Lumnitzera racemosa*, an estuarine tree species native to Southeast Asia and Australia originated from 14 specimens planted at Fairchild Tropical Botanic Garden in the early 1970’s. By the time it was discovered, naturalized and spreading from Fairchild into the native mangrove forest of Matheson Hammock County Park, the measured density of *Lumnitzera racemosa* saplings and trees was significant, with 24,735 stems per ha (Fourqurean, Smith, Possley et al.). Between February 2009 and April 2010, six volunteer workdays were organized by Everglades CISMA to delimit and map, mechanically remove and chemically treat the *Lumnitzera racemosa* infestation. In June of 2010, the Florida Fish and Wildlife Conservation Commission provided funding for a complete initial treatment of *Lumnitzera racemosa* by a private contractor (Habitat Restoration Resources). The second species, *Mikania micrantha*, a vine native to Central and South America and the Caribbean, was introduced to the Redland Agricultural Area of Homestead, most likely through the ornamental plant trade sometime in the early 2000’s. Its common name “mile-a-minute vine,” is due to the plant’s remarkable growth rate, measured at over three feet a week and *Mikania micrantha* has been recognized as one of the world’s most problematic invasive plant species. In late 2010 and early 2011, Everglades CISMA organized five volunteer workdays to delimit, map, mechanically remove and chemically treat as much of the infestation as possible. *Mikania micrantha* was originally thought to be confined to private property, plant nurseries and residences and rights-of-way but has since been found on two Miami-Dade County natural areas, Camp Owaissa Bauer (Griffin-Dozier and Possley) and Castello Hammock (Warren, MDPR). Both species were discovered fairly early on in their “invasion lag phase.” However each one presents unique challenges. Is eradication possible?

Accuracy of a Modified New Zealand Aquatic Weed Risk Assessment for the U.S.
Gordon¹, Doria, Crysta Gantz², Christopher Jerde³, and W. Lindsay Chadderton⁴
¹The Nature Conservancy, Gainesville, FL, ²University of Florida, Gainesville, FL, ³University of Notre Dame, Notre Dame, IN, ⁴The Nature Conservancy, Notre Dame, IN
We tested the accuracy of a risk assessment system for aquatic plants modified from that used by New Zealand’s Biosecurity Program for the U.S., Florida, and the Great Lakes region. The system includes 38 questions with additive scores within 12 categories of biological, historical, and environmental tolerance data. We identified 39 aquatic plant species that are major invaders in the continental U.S., 31 minor invaders, and 60 non-invaders. The species are from 57 families and span all aquatic growth forms. We had sufficient data to use 127 species for initial trials, leaving 2% of the species requiring further evaluation. At the U.S. scale, we found the highest accuracy, 97%, when a threshold score of 32 is used to differentiate non-invaders from major invaders. While accuracy was lower for the regional tests, in which local data were excluded, it remains above that currently accepted for terrestrial weed risk assessment. Model validation using 10 major invaders and 10 non-invaders resulted in 100% accuracy. Our results should facilitate management prioritization and prevention activities and provide data to enable the U.S. Department of Agriculture (APHIS-PPQ) to evaluate incorporating this tool within the revisions to the plant quarantine regulations (Q-37).

Search for New Management Techniques for Hydrilla and Hygrophila.
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Hydrilla and hygrophila are submersed aquatic weeds that can dominate water bodies, interfere with flood control, inhibit navigation, and alter plant communities if left unmanaged. They are both exotic, invasive plants that can cause serious environmental and economic impacts in Florida. In recent years, management of hydrilla has become more challenging due to the prevalence of a strain of hydrilla that is resistant to the herbicide fluridone (i.e., Sonar™). In 2006, a Demonstration Project on Hydrilla and Hygrophila was initiated in order to find new management techniques for hydrilla and hygrophila. Researchers have been evaluating new and existing herbicides for the effectiveness and searching for potential biological control agents as well as educating stakeholders. So far, this project has contributed to the registration of four new aquatic herbicides and several more are being evaluated for registration in the future. Monitoring of large-scale hydrilla treatments using registered herbicides has provided insight into the effectiveness of different combinations, application rates, and timing. In addition, several new potential natural enemies of hygrophila have been discovered and are being evaluated for host-specificity and effectiveness in controlling the plant. Researchers are also optimistic about the success of the hydrilla tip-mining midge, (Cricotopus lebetis), and it continues to be evaluated. Lastly, the results of the project are being communicated to the industry, public, and governmental partners through various demonstration and outreach strategies including a website, teacher workshops, field days, presentations for community groups and scientific meetings, exhibits at community events, and various publications.

Higgins¹, Alison
¹The Nature Conservancy, Summerland Key, FL

There are three rules of engagement for invasive species: Prevention (keeping it from ever getting into your area), Early Detection / Rapid Response (keeping it from becoming an issue), and Control (treat it forever and ever and ever). Until recently, the Florida Keys CISMA had mainly focused on control, and subsequently allowed new species to slip across our borders. The presentation will cover our CISMA’s process of recognizing, ranking and working cooperatively on our newest species, as well as reaching out to new partners. EDRR is a very important step that could save your area from decades of toiling over new species. Come learn from our struggles.

Effects of Metasulfuron and Prescribed Fire for Control of Lygodium microphyllum on Tree Islands in the A.R.M. Loxahatchee N.W.R.
Hutchinson¹, Jeffrey, and Kenneth Langeland¹
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Following aerial and ground treatments with metsulfuron to control *Lygodium microphyllum* on eight Everglades tree islands from 2006-2007, prescribed fire was applied to eight islands in August 2008. Visual observations at 1 month post-fire indicated >75% scorch of the tree islands with near complete loss of canopy cover, especially in the interior with high densities of *L. microphyllum* growing into the canopy. The perimeters of the tree islands were partially unburned. The majority of one area on a single tree island, which was dominated (99%) by native vegetation, was not affected by fire. Six and 12 months post-fire, following two herbicide applications, *L. microphyllum* was still common on all tree islands, accounting for > 4% cover. There was a loss of dominant ground cover of native ferns with a concomitant increase in ground cover species richness and evenness six and 12 months post-fire. Ground cover six and 12 months post-fire was dominated by early successional and ruderal plants, not typically found on tree islands. We observed a reduction in canopy cover from 45% pre-treatment (2005) to 9% at six months and 14% at 12 months post-fire (2009). It is unclear how prescribed fire affects tree island ecology over time, but combining herbicide treatment and fire did not eliminate *L. microphyllum* while concomitantly altering the structure and composition of the tree islands. The use of herbicide and fire on tree islands over a large scale within A.R.M. Loxahatchee N.W.R. will completely change the structure and composition of the tree islands. At this time, we do not recommend prescribed fire following herbicide application for control of *L. microphyllum* on tree islands. Further research is needed to determine the effects of herbicide and fire on tree islands that have no tree canopy, few native plants and near 100% cover of *L. microphyllum*.

**Tolerance of *Lygodium microphyllum* and *L. japonicum* Spores and Gametophytes to Freezing Temperature.**

Hutchinson¹, Jeffrey, and Kenneth Langeland¹

¹University of Florida, Center for Aquatic and Invasive Plants, Gainesville, FL

Spores and gametophytes of *Lygodium microphyllum* and *L. japonicum* were exposed to -2.2 ºC for 0, 0.25, 0.5, 0.75, 1, 3, 6 and 12 hours to determine freeze tolerance. An additional experiment was conducted under the same conditions to determine the freeze tolerance of *L. microphyllum* sporophytes. Spore germination rates of *L. microphyllum* were reduced during longer exposure times to freezing temperatures (P = 0.0072). *L. microphyllum* spores had lower germination rates after being frozen for 3 hours and were highly susceptible to freezing periods 6 hours with a 5.8 to 13.3-fold reduction in spore germination compared to controls. There was no difference (P = 0.32) between germination of *L. japonicum* spores at any exposures rates or controls. Gametophytes of *L. microphyllum* had reduced survival at all exposures to freezing temperatures compared to controls (P < 0.0001). There was a 6.5-fold decrease in gametophyte survival for all exposure times of *L. microphyllum* compared to controls. *L. microphyllum* gametophyte survival was <0.5% for exposure times > 3 hours. The gametophytes of *L. japonicum* had reduced survival at exposures to freezing temperatures > 1 hour (P < 0.0001) compared to controls. *L. japonicum* gametophyte survival was 52.5% at 3 hours exposure time, but dropped to < 0.1 at exposure times > 6 hours. All *L. microphyllum* sporophytes exhibited 100% necrosis for all exposure times 24 hours post-exposure, but new growth was observed for exposure time > 6 hours at six months post-exposure. *L. microphyllum* sporophytes dry weight biomass was greatly reduced for all exposure times compared to controls (P < 0.0001). An 18-fold or higher reduction in sporophyte weight was recorded for all exposure times > 3 hours. Results with non-linear regression (R2 = 0.92) indicted that a single freeze at -2.2 ºC would reduce OWCF dry weight biomass to 0.1, 0.01, and 0.0001 g at five months post-freezing for freeze times of 1.7, 2.5, and 4.0 hours freeze, respectively. These results indicate that *L. japonicum* spores and gametophytes are more tolerant of longer exposure periods to freezing temperatures than *L. microphyllum*. However, the spores of *L. microphyllum* can survive freezing temperature with a 50% reduction in viability compared to controls and re-growth occurred in sporophytes frozen up to 6 hours. This indicates the potential of *L. microphyllum* to spread further in northern Florida.
Marsilea Ferns (Water Clover): Endemism and Invasion in Florida.
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Marsilea ferns (water clover) are potentially invasive aquatic and wetland plants that can be difficult to identify because of subtle diagnostic characters, sterile specimens, and unresolved taxonomic problems. Six species occur in Florida, all of which have been considered non-native and introduced. In 2008 we used molecular sequencing data to reveal that two of these species belong to a single entity which is actually native to the entire Gulf coastal plain; three species were correctly identified as Australian and Southeast Asian species M. hirsuta, M. mutica and M. minuta, and one species, M. aff. oligospora, remained unknown. In this study, we utilized DNA sequencing of several plastid regions to “fingerprint” Marsilea specimens from around the world in order to provide an accurate identification and source of origin for the unknown plants that have been expanding at several locales in central Florida. Molecular sequencing was expected to resolve not only the question of its endemism, but also the applied need of whether weed management or conservation protection should be employed. Our results conclude the unknown Florida specimens represent an undescribed species that is native in Florida. We suggest that its recent expansion, as has been observed in and around Emerald Marsh, Eustis may indicate the return of more natural hydroperiods in the Lake Griffin ecosystem. Its occurrence can be expected to increase following disturbance events, either natural or manipulated, which open the canopy and incorporate fluctuation into surface waters.

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Dependence on fossil fuels for transportation energy, as well as concerns related to so-called "greenhouse gas" emissions as a product of fossil fuel combustion, has led to increasing interest, over the last 40 years, in the use of renewable sources of energy such as crops for energy production. These crops are referred to as biomass crops, energy crops, e-crops, or bioenergy crops. Because energy production can compete with human food demands, interest has grown in the use of alternative non-food crops for this purpose. Most of these, so-called, second generation crops are non-native, which raises the question of their weed/invasive potential, especially if propagule pressure is increased as a result of large-scale plantings. In fact, species such as Arundo donax that have known invasive characteristics have been proposed for large-scale planting in Florida. The National Invasive Species Council has recommended that the U.S. Federal Government take steps to minimize the risk of biofuel crops becoming invasive. The Florida Department of Agriculture and Consumer Services (DACS) has taken steps to minimize the risk of biofuel plantings by requiring permits for plantings that have potential of becoming invasive. DACS consults with IFAS to determine, using the IFAS Assessment and Weed Risk Assessment, those species that may have invasive potential. Extensive research is conducted to evaluate inter- and intra-specific taxa for suitability as biomass crops. It is imperative that research not only evaluate energy potential but also invasive characteristics of these taxa. Current IFAS research is evaluating species for biomass production potential along with evaluating biological characteristics, which can be used to assess invasive potential of taxa related to species known to be weeds in Florida.

The University of Florida Northwest IFAS Extension District: It’s Expanding Role Educating Private Landowners about Invasive Species Management.
Ludlow¹, Judy
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Landscapes in predominantly rural northwest Florida are not normally associated with having large monocultures of invasive plants such as Brazilian pepper and melaleuca in south Florida, but there are many non-native species which impact thousands of acres in north Florida. Japanese climbing
ferns, Chinese tallow, privet, cogon grass, and coral ardisia are a few examples which infest agricultural and natural lands, and threaten the diverse assemblage of native plants in north Florida. According to the Calhoun County Herbarium, 93 herbarium specimens are identified as non-native in Calhoun County alone. The University Of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) Extension Service is structured in a way that can support invasive plant management efforts on public lands by educating private landowners. Because long term management of invasive species on public lands is not effective without management on adjoining private lands, it is critical to educate private landowners. Agriculture and Natural Resource agents in the NW Florida Extension District participate in both the Apalachicola Invasives Working Group and the Six Rivers Cooperative Invasive Species Management Area group. In panhandle Florida, five invasive species workshops were held in coordination with UF/IFAS extension agents from Jackson, Calhoun, Gadsden, Gulf, Liberty, and Franklin Counties, the UF/IFAS Florida Forest Stewardship Program, the Apalachicola Invasive Species Working Group, and representatives from the FL Fish & Wildlife Conservation Commission, the Department of Agriculture and Consumer Services, and the US Department of Agriculture, in 2010. The objectives of these and future workshops are to educate private landowners about invasive species management issues, about the important role they play in long term management success, about identifying and controlling locally common invasive plants, and to provide information about funding opportunities that may be available to them. Over one hundred people attended these workshops and gained knowledge of invasive plant management. The majority of participants (>80%) learned something new and indicated they would change some aspect of their current land management practices based on what they learned. These results are encouraging and the UF/IFAS NW Extension District will continue these efforts through future workshops, newsletters, internet, radio, local newspapers, and participation with their local CISMA group.

Restoration Strategies Following Cogongrass Removal in Reclaimed Phosphate Mines.
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Cogongrass remains as one of the most problematic invasive species in upland habitats and is a major problem in mineland reclamation in central Florida. Restoration of these areas is critical to reestablish functional communities, but reinvansion by cogongrass and other non-desirable species is often a major impediment. Therefore, techniques to attain rapid colonization of desirable native species and prevent cogongrass reestablishment are critical. We established 3 community types in a previously cogongrass infested area, spatially next to, but not within, regions of cogongrass regrowth. Specific objectives were: 1) determine if community type was a deterrent to cogongrass invasion and 2) determine if supplemental herbicide applications were needed to aid in cogongrass deterrence. The 3 community types were: 1) grass only, 2) grass and forb or 3) grass, forb and shrub. Eight plots of each were established in March of 2008, with half of the plots receiving glyphosate (3% spray v/v) in the fall of 2008 and 2009 to control invading cogongrass. Visual assessment of native plant and cogongrass growth were taken every 6 months for 3 years and native plant biomass was also taken for the first 18 months of establishment. There were little differences between the growth and establishment of plants within each community type, most probably due to poor survival of many forb species. Moreover, the shrub species (Ilex glabra) expired within the first 3 months of planting in all plots. It was noted that the grass only plots showed better growth initially and were better suited in this area due to a heavy infestation of hairy indigo (Indigo hirsuta), which was controlled with a broadleaf specific herbicide in the fall of 2008. Despite the excellent growth of the native grasses, supplemental herbicide applications were needed to prevent cogongrass reinvasion in all plots. It was also noted that seedling colonization of several grasses, especially Eragrostis spectabilis, was occurring outside the plot areas were cogongrass was controlled. Collectively, these data point out the need for vigilant cogongrass control when restoring in previously infested areas and careful selection of plant material when other undesirable weedy species may hamper restoration efforts and require herbicide treatment.
Biology and Preliminary Host Range of *Paectes obrotunda* (Lepidoptera: Noctuidae), a Potential Biological Control Agent of Brazilian Peppertree.

Manrique1, Veronica, Rodrigo Diaz1, and William Overholt1

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Brazilian peppertree (*Schinus terebinthifolius* Raddi) (Anacardiaceae), native to South America, invades a variety of habitats in Florida including disturbed sites and natural communities. Surveys of natural enemies were conducted in the area of Salvador, Bahia in March 2010, and several candidates were imported into Florida quarantine for further examination. A colony of a defoliating moth was successfully established on Florida Brazilian peppertree plants, and this moth was later identified as *Paectes obrotunda* Guenee (Noctuidae). The objectives of this study were to examine the biology and host range of *P. obrotunda* in order to determine its potential as a biocontrol agent of Brazilian peppertree in Florida. The survival and development of all immature stages were determined inside growth chambers at 25°C, and fecundity and adult longevity were examined in cages. In addition, larval development and adult oviposition were evaluated under no-choice conditions. Twenty first instars were placed on each plant (Brazilian peppertree, and 10 related plant species) and development to adult and feeding damage were recorded. Finally, adult oviposition was evaluated under choice conditions by releasing eight pairs of adults inside large mesh cages with one Brazilian peppertree and one non-target plant. The total number of larvae produced per plant was recorded after a 2-week period. *Paectes obrotunda* laid single circular eggs on Brazilian peppertree foliage, completed five instars, and pre-pupal stage larvae stopped feeding and formed cocoons. Survival from larva to adult was of 50%, and lifetime fecundity was of 146 ± 20 eggs per female (means ± SE). Males (29 ± 2 days) lived longer than females (18 ± 3 days) when feeding on Gatorade, while both genders had shorter life spans when provided with water (4.5 ± 0.6 days). Based on no-choice tests, *P. obrotunda* completed development on Brazilian peppertree and four non-target plants (two natives to FL, two introduced not present in FL). However, adult oviposition showed a narrower host range under no-choice and choice conditions. The implications of these results are discussed in the context of biological control.

Aerial Surveys of Invasive Plants on the Lake Wales Ridge – Limitations, Lessons Learned and Lots of Value.

Millett1, Cheryl, Clarence Morgan2 and Tabitha Biehl-Gabbard3

1The Nature Conservancy, Babson Park, FL, 2Avon Park Air Force Range, Avon Park, FL, 3Polk County Natural Resources Division, Bartow, FL

Good data collection on the occurrence of invasive plants is often limited by lack of time and money; however, a lack of data can lead to wasted or misplaced effort in treating invasives because of incomplete knowledge of the distribution of the problem and efficacy of the treatment. To address this problem, the Lake Wale Ridge Ecosystem Working Group began aerial surveys to map invasive plants in and around public conservation lands in 2004 in an effort to find the extent of infestations in remote areas. Those surveys have been continued biennially through 2010, with plans to continue in 2012. One of the main drivers of this effort was the desire to find *Lygodium microphyllum* and ground surveys in remote and difficult to cover areas like bay swamps, where *L. microphyllum* is likely to occur, can be very time, and therefore money, consuming. There have been changes to the aerial survey approach, training of observers, and type of aircraft used, but two things have remained consistent: the fervent desire of conservation land managers to collect these data to find infestations in remote areas without an intensive commitment of personnel on the ground, and the reliance on a partnership to keep these surveys going. Key partners have been South Florida Water Management District and the Air Force, which provided aircraft, while federal, state and local partners in the Heartland Cooperative Invasive Species Management Area (CISMA) have provided observers. Despite changes in survey approach that limited our ability to compare results over time, we were able to test key hypotheses. Given treatment, we would hope to see over time that there are fewer occurrences, smaller acreage infestations, and fewer high coverage infestations. We found more points over time, marginally fewer large infestations in 2008, and fewer “dense” infestations after 2004. While we don’t know that treatment itself had an effect on the Lake Wales
Ridge scale, these data suggest treatment did not diminish the spread of occurrences or necessarily make them smaller across the landscape, but the decrease in dense cover infestations means that there were fewer infestations that significantly changed the character of their environment by covering swaths of trees. Conservation land managers reported the biggest value to them was to get specific locations to allow navigation directly to remote infestations without the staff time-consuming step of ground surveys to detect them.

**An Update on *Phragmites* in Florida.**
Overholt¹, William, Dean Williams², Megan Hanson², Rodrigo Diaz¹, and Veronica Manrique¹
¹University of Florida/IFAS Biological Control Research & Containment Lab, Fort Pierce, FL, ²Texas Christian University, Fort Worth, TX

Over the past 150 years, the distribution of *Phragmites australis* in North America has greatly expanded, and it is now considered to be invasive in parts of its range. The spread of *P. australis* in North America has been attributed to the cryptic invasion of a Eurasian genetic lineage. In North America, there are three genetic groupings of *Phragmites*: native North America lineages, a Gulf Coast lineage and the exotic Eurasian lineage. The Eurasian lineage is an aggressive invader that has outcompeted and replaced nearly all native types along the central and northern east coast of the United States. The origin of the Gulf Coast lineage is uncertain, as it also occurs in South America, Australia and Asia, and may represent a different species. We sampled populations of *Phragmites* in Florida, Alabama, Mississippi, Louisiana, Georgia, South Carolina and Canada, and used morphological characters and molecular chloroplast markers to determine their lineages. All populations sampled in Florida and Alabama were the Gulf Coast lineage, while only Eurasian *Phragmites* was found in South Carolina and Georgia. In Mississippi one exotic population was located in Jackson along the Pearl River, and in Louisiana two exotic populations were found in the lower Mississippi River Delta. The closest a Eurasian population was found to Florida was 40 miles north of the Florida/Georgia border along I-95. Morphological observations revealed that three characters could be used to reliably distinguish Gulf Coast and Eurasian *Phragmites*; the form of the inflorescence, stem texture and stem color.

**Assessing Invasive Plant Distributions in the Florida Everglades.**
Pernas¹, Tony and LeRoy Rodgers²
¹The National Park Service, Palmetto Bay, FL, ²South Florida Water Management District, West Palm Beach, FL

With 2.7 million acres of combined management area, land managers within the Everglades Cooperative Invasive Species Management Area require a financially efficient and rapid monitoring method to assist with weed management strategies and to provide early detection of new infestations. To meet this need, the South Florida Water Management District, the National Park Service’s Florida/Caribbean Exotic Plant Management Team, and South Florida/Caribbean Inventory and Monitoring Network are utilizing digital aerial sketch mapping (DASM) to map invasive plant species from low flying aircraft throughout the Greater Everglades. The DASM system consists of two networked tablet PCs, which are linked to a GPS receiver. Specialized mapping software (GeoLink™, Baker, Inc.) allows the user to draw points, lines and polygons directly on the digitizing tablet with the aid of continually repositioned background imagery. A complete census of the Greater Everglades during 2009-2010 revealed that 72,184 ha (178,372 ac) are infested with one or more of four priority species—Australian pine (*Casuarina* spp.), Brazilian pepper (*Schinus terebinthifolius*), *melaleuca* (*Melaleuca quinquenervia*), and Old World climbing fern (*Lygodium microphyllum*). On a gross infested area basis, melaleuca was the dominant invasive plant in the region (41,938 ha) during the sampling period. Brazilian pepper was widely distributed throughout the Everglades, occupying an estimated 27,282 ha of mangrove fringe, tree island, cypress swamps, and disturbed lands. Old world climbing fern was a dominant invader of tree islands cypress swamps, and coastal prairies, occupying 2840 ha. Australian pine remained a significant invader in the southeastern portions of the Everglades (2,338 ha).
New Projects for Bugwood 2011.
Rawlins¹, Karan and Charles Bargeron¹
¹University of Georgia, Center for Invasive Species and Ecosystem Health, Tifton, GA

New projects for Bugwood and The Center for Invasive Species and Ecosystem Health at the University of Georgia for 2011. One project for 2011 will be to lead in the development of the Extension Community of Practice for Invasive Species. The primary goal of this national collaborative effort is to provide access to accurate quality information on invasive species to extension clientele focusing on Master Gardeners and Cooperative Extension Service Agents. Increasing awareness and knowledge of invasive species allows issues such as management strategies for prevention, eradication and control to be addressed more effectively. Better management of invasive species will reduce the high cost of invasives species to our environment and our economy. We are also planning to convert ‘A Field Guide for the Identification of Invasive Plants in Southern Forests’ into an iPhone app. The application will provide images of the invasives along with information on their biology, ecology, distribution and control, as well as information on other species they resemble. The app will also allow for reporting occurrences of these species to EDDMapS. These are only two of the projects planned by Bugwood for 2011.

The Central Florida Lygodium Strategy: Cultivating Landscape-scale Invasive Plant Management.
Rowe¹, Rosalind
¹The Nature Conservancy, Altamonte Springs, FL

The Central Florida Lygodium Strategy (CFLS) is a partnership administered by The Nature Conservancy (TNC) that works with private landowners and federal, state and local land management conservation agencies and groups, to stop the northward migration of Lygodium microphyllum in Florida. This landscape-scale partnership has provided a private lands initiative, built an infrastructure to share the work and funding necessary for effective rapid detection and early response across all fence lines, and is “drawing a line on the vine” by establishing a sentinel zone across the central region of the state. During 2010, CFLS worked with public land managers and private landowners in Hernando, Hillsborough, Polk, Lake, Volusia, Seminole and Orange Counties, to locate and control the northernmost infestations of Old World climbing fern (OWCF). Since its inception in 2006, over 900,000 acres have been surveyed, with over 2600 acres worked on 31 private properties, buffering at least 25 conservation areas. Challenges have included plants resisting treatments in certain soils and finding that the confirmation of our northern line requires better data. Direct funds for CFLS have been awarded through a USDA Cooperative Forest Health Program grant administered by the Florida Division of Forestry, the US Fish and Wildlife Service Partners for Fish and Wildlife Program, the Southwest Florida Water Management District and private donors. Matching funds and in-kind services have been generated through the Florida Department of Protection Bureau of Invasive Plant Management, and the South Florida Water Management District. On-the-ground assistance, by sharing treatment work and by establishing sentinel sites for long-term monitoring, is coming from Florida Natural Areas Inventory, Florida Division of Forestry, Florida State Parks, several Water Management Districts, as well as county lands managers and others. Not only does CFLS provide a tool for getting OWCF removed from private lands, but it provides a model and framework to simplify planning efforts for other species’ invasions. This presentation reviews the aspects of CFLS that are transferable for other projects, from building on its existing infrastructure in central Florida, to using it as a model for other regions.

Lygodium, Lygodium – What Are We to Do with You? A Mini-Symposium to Share What’s Being Done to Control These Ferns.
Rowe¹, Rosalind, LeRoy Rodgers², and Corrie Pieterson³
¹The Nature Conservancy, Altamonte Springs, FL, ²South Florida Water Management District, West Palm Beach, FL, ³University of Florida, West Florida Research and Education Center, Jay, FL
This is a workshop to present recent research and experiences around controlling the invasions of Lygodium japonicum and Lygodium microphyllum in Florida. It’s been a while since there’s been a gathering of the minds regarding these non-native Lygodium in Florida. A lot of work has been done regarding these plants since the last workshop in 2006! With Japanese climbing fern having now crossed the state from its northern borders and Old World climbing fern having crossed the southern part of the state and now moving north, and with both ferns invading complementary habitats across the central part of the state, it is a good time to pow-wow. A combination of short presentations and open discussions will provide a forum for sharing our efforts, and evaluating where we are with respect to our battles with these plants and how we might best plan our next steps. There will be an exchange of anecdotal and research experiences, with news from the field from many who have been taking on the day-to-day work, so everyone who works with these ferns is invited to participate. We’ll hear about experiences with impacts from varying water levels, varying temperatures, chemical resistance issues, and seasonal management. Topics such as prevention, vector studies and decontamination also will be addressed. For Japanese climbing fern, current research reports will come from Kimberly Bohn, Assistant Professor UF-Milton; Dr. Patrick Minogue, Assistant Professor UF-Quincy; and Clyde Smith, among others. For Old World climbing fern, Anthony Boughton, USDA ARS; Jeff Hutchinson, UF Center for Aquatic & Invasive Plants; and others will open discussion on such topics as biological control and application challenges and successes.

Long Live the CISMA! Sustaining and Strengthening Cooperative Invasive Species Management Areas (CISMAs) in Florida.
Serbesoff-King¹, Kristina, Erin Myers², Linda Duever³, Tony Pernas⁴, Aaron Levine⁵, Alison Higgins⁶, Kelli Gladding⁷, Cheryl Millet⁸, Rosalind Rowe⁹, Mike Renda¹⁰, Josh Spies¹¹, Michael Sowinski¹², Sherry Williams¹³, Gordon Rothe¹⁴

¹The Nature Conservancy, Hobe Sound, FL, ²US Fish and Wildlife Service, Naples, FL ³Marion County ISMC, ⁴Everglades CISMA, ⁵First Coast ISWG, ⁶Keys CISMA, ⁷East Central Florida CISMA, ⁸Heartland CISMA, ⁹Green Swamp CISMA, ¹⁰Treasure Coast CISMA, ¹¹Apalachicola Regional Stewardship Alliance CISMA, ¹²Suncoast CISMA, ¹³Central Florida CISMA, ¹⁴Six Rivers CISMA

The mission of the Florida Invasive Species Partnership (FISP) is to improve the efficiency and effectiveness of preventing and controlling invasive non-native species through partnering to increase communication, coordination and use of shared resources in order to protect wildlife habitat, working agricultural and forest lands, natural communities and biodiversity in Florida. To this end, FISP has worked with existing Cooperative Invasive Species Management Areas (CISMAs) and supported the formation of new CISMAs. A Cooperative Invasive Species Management Area is a partnership of federal, state, and local government agencies, tribes, individuals, and various interested groups that manage invasive species in defined area. From the panhandle to the Keys, these CISMAs are working across boundaries to control and prevent the threat of invasive species. Activities range from holding partner workdays to control invasive plants, conducting training on the identification and control of invasive plants, coordinating rapid response to one of the world’s worst weeds, to joining together statewide to host events and raise public awareness during National Invasive Species Awareness Week. Together, these coordinated efforts are serving to protect our valuable conservation areas, public lands and private lands from the continuing colonization of invasive species. To date: •Florida has 16 CISMAs •70% of Florida's land area is covered by the CISMAs In this panel discussion, members of the CISMAs in Florida will come together to present the results of their partnerships and share experiences. There will be a facilitated discussion following and audience participated is encourage.

Songer¹, Kevin

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Florida Green Roofs, The New Frontier for Invasive and Exotic Species. Case Studies from World Green Roofs. Communities benefit from green roofs. The presentation informs us why we must work to educate green roof designers, municipalities, nursery owners, landscape architects and others involved in the construction as to why invasive and exotic plants should not be used as plants for green roof projects, and why native species instead offer opportunities for enhancing biodiversity.

Presentation Component Kevin Songer, J.D., LEED AP®, Certified Arborist & Municipal Specialist, MetroVerde Decisions to design and construct green roofs within the Urban Core are critically important to the future of our communities because i) vegetated roofs provide much needed habitat for urban wildlife, ii) green roofs offer commercial opportunities for the nursery industry, and iii) properly designed roof plantings can provide habitat for the recovery of endemic species. For this presentation we address these three issues, offering practical insight for development of Green Roofs using Native Plant Species and providing education with respect to exotic and invasive species. For i), we propose that restoration of volumetric green back to the Urban Core can strengthen endemic ecosystem biodiversity characteristics. For ii), we will share actual stories of successful use of native plant species and biodiversity studies completed and projects financial and design successes, and in alternative, actual recent Florida and worldwide green roof designs where exotic and invasive species have been specified, used and resulting ecological and commercial problems, for iii) we propose innovative rooftop space and planting systems as a potential platform to provide habitat for Florida endemic native plant species. The Green Roof industry is growing exponentially. Plants used across the nation may or may not be suited for use in Florida’s urban core depending on the species potential for invasive proliferation All Floridians possess a stake in the education of those participating in the green roof industry with respect to the benefits of native and endemic plant species. We can learn from cost-effective, innovative & existing green roofs utilizing native and endemic plant species and learn too the lessons of exotic species use. Note: This presentation will include extensive project examples – successes and failures, testing programs and procedures and results. Intent is to provide the audience with a solid level of information on invasive plant species specified and used and over-used in green roof installations, here in Florida and around the world.

Do Native and Nonnative Species Respond the Same to Climate Change?
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Understanding species responses to global change will help predict shifts in species distributions as well as aid in conservation. Spring events such as leaf unfolding and flowering are associated with changes in air temperature. Changes in the timing of seasonal activities of organisms over time may be the most responsive and easily observable indicator of environmental changes associated with global climate change. It is unknown how global climate change will affect species distributions and developmental events in subtropical ecosystems or if climate change will differentially favor nonnative species. Here we document a trend for delayed seasonal flowering among plants in Florida. Surprisingly, there were few differences in reproductive responses by native and nonnative species to climatic changes in Florida. The vast majority of empirical research has documented earlier reproductive onset with increasing spring temperatures, and these studies have largely occurred in mid to higher latitudes. We argue that plants in Florida have different reproductive cues than those from more northern climates. With global change, minimum temperatures have become more variable within the temperate-subtropical zone that occurs across the peninsula and this variation is strongly associated with delayed flowering among Florida plants.

Restoring Abandoned Citrus Groves: Reducing Biotic and Abiotic Barriers to Native Plant Establishment.
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Land-use legacies associated with agriculture, such as increased soil fertility and elevated soil pH, promote invasions by exotic species on former agricultural lands. After agricultural abandonment, which are typically stronger competitors under these modified conditions, displace and inhibit the establishment of native species. Restoring natural soil conditions (i.e., low fertility and low pH) may be an effective, long-term method to control and reduce the abundance of exotic species that invade abandoned agricultural lands. In this study, we are examining how lowering soil fertility with carbon additions and lowering soil pH by applying sulfur affects exotic species richness and cover (specifically of *Panicum maximum* and *Rhynchelytrum repens*) in two former citrus groves that were historically scrub/scrubby flatwoods. Exotic biomass was removed by one of three methods (tilling, topsoil removal, black plastic) in addition to a control (in which no biomass was removed), and was combined with a soil amendment of sulfur, sawdust, sulfur plus sawdust, or none. The biotic treatments significantly decreased exotic biomass, and specifically topsoil removal was the most effective. The abiotic treatments, however, had no effect on the exotic species cover. In the north grove soil pH was significantly reduced (by 0.5) in the tilling plus sulfur treatment; however, there were no significant changes in pH in any other treatments. The south site, which had a higher initial cover of exotic species, showed no significant changes in pH per treatment, suggesting that cover of exotic biomass may hinder the effectiveness of sulfur for lowering pH. In May 2010 we seeded every plot with a mix of native grasses and forbs, and in November 2010, we planted acorns of *Quercus geminata*, *Q. chapmani*, and *Q. myrtifolia* into every plot. However, we have not seen any germination yet, but this may be due to the unusually low amount of precipitation of the past year. Overall, our results suggest that disturbing the soil (e.g., tilling and topsoil removal) is an effective method for removing exotic biomass, but must occur several times in order to significantly reduce exotic species richness and cover. Likewise, the addition of soil restoration amendments may have to occur several times in order to detect any changes in soil chemical properties that would affect plant community composition.

**Brazilian Pepper Biological Control; Updates from Foreign Exploration and Host Testing.**

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Brazilian pepper is among the worst environmental weeds in Florida and other areas of the southeastern US. This species occupies diverse habitats causing many environmental problems including decreased biodiversity of the infested areas. Although chemical controls are known and used to control this invasive species, biological control presents an attractive alternative when practiced safely. The native range of this species primarily includes eastern Brazil and northern Argentina. The USDA/ARS Invasive Plant lab, colleagues at the South American biological control lab, and the Brazilian university colleagues have been conducting foreign surveys searching for insects that will be safe and effective at controlling Brazilian pepper in the US. Surveys have revealed many new herbivores and testing is underway on a thrips, a leaf miner and a caterpillar. Progress will be presented describing the potential of these herbivore species as potential biological control agents.

**Biological Control of Chinese Tallow; Results from Foreign Exploration and Host Testing.**

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Chinese tallow is among the worst environmental weeds in Florida and other areas of the southeastern US. This species occupies diverse habitats causing many environmental problems including decreased biodiversity of the infested areas. Although chemical controls are known and used to control this invasive species, biological control presents an attractive alternative when practiced safely. The native range of this species primarily includes central and southern China. The USDA/ARS Invasive Plant lab, colleagues at the Australian biological control lab, and the Chinese
Academy of Science have been conducting foreign surveys searching for insects that will be safe and effective at controlling Chinese tallow in the US. Surveys have revealed many new herbivores throughout the native range of these species. These include many new weevil, thrips, psyllid, eriophyid mites and lepidopteran species. Several of these species are, or have undergone preliminary testing to determine suitability for release here. Progress will be presented describing the potential of these herbivore species as potential biological control agents.
Temperature-dependent Development and Cold Tolerance of *Gratiana graminea* (Chrysomelidae), a Potential Biological Control Agent of *Solanum viarum* in Florida.

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Tropical soda apple (TSA), *Solanum viarum* Dunal (Solanaceae), is an invasive weed of pastures, rangelands and natural areas in Florida. It is native to South America, and was first observed in Florida in 1988. The biological control agent *Gratiana boliviana* Spaeth (Chrysomelidae) was released in Florida in 2003. Establishment and successful regulation of TSA have been reported in south and central parts of the state, but in north Florida, *G. boliviana* does not perform as well. Reasons for inferior performance in north Florida may include poor adaptation to the cooler winter climate and asynchrony between beetle activity and TSA seasonal phenology. A new candidate biocontrol agent, the leaf-feeding beetle *Gratiana graminea* Klug, is currently under investigation in Florida quarantine. The objective of this study was to evaluate the survival and development of *G. graminea* at six constant temperatures from 15 to 30°C. In addition, cold tolerance was evaluated by exposing diapausing and reproductive adults to 0°C for different periods of time. *Gratiana graminea* completed development from egg to adult at 20 to 30°C, while no survival was detected at 15°C. Developmental time from egg to adult was longest at 20°C (34.2 d) and shortest at 30°C (14 d). Using linear models, the lower developmental threshold for immature development was estimated to be 11.68°C, and 312 degree-days were required to complete development. Diapausing adults were more cold tolerant than reproductive adults. The LT50 and LT90 at 0°C for diapausing *G. graminea* were 19 and 41 days, respectively. Comparisons between the two *Gratiana* spp. are discussed.

GTM Invasive Species Task Force – An Integrated Approach to Managing Invasive Plants at the Local Level.
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Invasive Species are a priority issue for the National Estuarine Research Reserve System, the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR) has been working to address the issue locally for ten years. The watershed of the GTM NERR encompasses an area on the East Coast of Florida from Ponte Vedra south to Flagler Beach, roughly bordered on the western edge by Interstate 95. Many partners manage various portions of the land within the GTM NERR including the Florida Fish and Wildlife Conservation Commission (FWC), the St. Johns River Water Management District (SJRWMD), the Florida Division of Forestry (DOF), the Florida Department of Environmental Protection (DEP), and St. Johns and Flagler County. The GTM NERR is a founding member of the local Cooperative Invasive Species Management Area, the First Coast Invasive Working Group (FCIWG) and has worked very closely with local communities on outreach and control efforts. Within the GTM NERR, the stewardship, research, and education teams all work on various facets of this issue. Over the last two years, to better coordinate our approach among these teams the GTM Invasive Species Task Force was initiated with a current focus on invasive plants. The goals are to map, monitor, control, and increase awareness of invasive plants within the watershed, and to protect and prevent the establishment of new invasive species on GTM NERR publicly managed lands. Working together the Task Force has spearheaded a private partnerships campaign that has facilitated the removal of invasive plants on over 120 acres of both public and privately owned lands. Creating strong partnerships with local condo and homeowners associations has resulted in the removal of large strands of Brazilian pepper from coastal dune and estuarine habitats. Another very successful partnership involves two private landowners whose properties are adjacent to the Matanzas State Forest and are infested with Chinese Tallow and Air Potato, directly contributing to infestations in the State Forest. With our volunteers and landowner participation we have begun eradication efforts on their lands. We have held two successful education events in
which we increased public awareness and recruited volunteers for control efforts. Combined efforts of the GTM NERR staff, volunteers, and local partners have demonstrated that a high level of success can be achieved in a short amount of time.

**Accumulated Melaleuca quinquenervia Litter Effects Seedling Recruitment and Survival in Invaded Sites.**
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The rate of Melaleuca quinquenervia (melaleuca) leaf litter disintegration is relatively slower compared to some sympatric species such as sawgrass. Such a phenomenon results in an accumulation and development of a thick cover of melaleuca leaf litter on the forest-floors. The cover may be impeding the emergence and survival of seedlings on forest-floors in melaleuca invaded sites. Partially open mature melaleuca stands were used to test these assumptions. Four 12-wk experiments were conducted year around in sequence to examine the seasonal effects on seedling emergence and survival. Melaleuca litter cover inhibited seedling emergence of all species, it did not affect the survival of emerged seedlings. Litter removal during wet period accelerated seedling emergence and survival. Four 12-wk-spaced (96-wk long) experiments on litter removed soils revealed that 1) emergence of melaleuca seedlings was higher in arenaceous (compared to organic) soils during the first 12-wk but was very low afterward during 96-wk. Overall, the removal/disturbance of litter cover from forest-floors and exposure of mineral soils during wet periods was found to accelerate emergence and survival of seedlings leading to site rehabilitation through increased plant diversity.

**Cricotopus lebetis** (Diptera: Chironomini), a Fortuitous Biological Control Agent of *Hydrilla verticillata*
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A chironomid midge, *Cricotopus lebetis*, was discovered attacking hydrilla in Crystal River, Citrus Co., Florida in the 1990s, and may be a recent introduction into Florida. Larvae of the midge mine in the apical meristems of hydrilla, causing basal branching and stunting of the plant. The midge has been found in other Florida water bodies, but is not often abundant. Water temperature and quality are important environmental indicators and may influence the distribution and density of the midge. Survey work has been conducted around the state to correlate water quality, including temperature, to the presence or absence of *C. lebetis*. The upper and lower temperature thresholds for development of *C. lebetis* were determined by exposing neonate larvae to hydrilla tips in growth chambers. In addition, we are evaluating the host range of *C. lebetis* as this information will be crucial in determining whether *C. lebetis* can be released in states and countries where it does not occur already. The results of these studies will be used to assess the potential of *C. lebetis* as a biological control agent of hydrilla.

**Risk Assessment: Progress of Quarantine Biocontrol Research on Melaleuca.**
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Melaleuca, *Melaleuca quinquenervia* (Myrtales: Myrtaceae), is a well studied invasive tree species in south Florida. Spread and recruitment has been reduced by three of four released and established natural enemies which attack young growth. Attack of more mature plant parts would add additional pressure on vigor of saplings and trees. *Lophodiplosis indentata* (Diptera: Cecidomyiidae) is a fly whose larvae cause pea like galls on more mature leaves. Approximately 3000 *L. indentata* galls were imported in January 2011 from a laboratory colony established by researchers at the USDA/CSIRO ABCL in Brisbane, Australia, to IPRL researchers at the FDACS DPI quarantine in
Gainesville, FL. Adults emerged from the galls for more than 2 wks and were used to establish a quarantine laboratory colony. Successive generations will be utilized for host range tests beginning in April 2011.

**Risk Assessment: Progress of Quarantine Biocontrol Research on Downy Rose Myrtle.**
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Downy Rose Myrtle, *Rhodomyrtus tomentosa* (Myrtales: Myrtaceae), is an invasive shrub in south Florida. Exploration by USDA/CSIRO ABCL scientists has been conducted for natural enemies in its native range, southeast Asia, in collaboration with local cooperators. In May 2010, several potential candidates for biological control were imported from Hong Kong to quarantine for rearing, identification, collection of biological data, and assessment of damage. Of primary interest were two species *Metharmostis* sp. (Lepidoptera: Cosmopterigidae) and *Hemenias* sp. (Lepidoptera: Tortricidae). Temporary laboratory colonies were established of both species and maintained for two to four generations. Several individuals of each species were reared from egg to adult to identify eggs and oviposition sites, determine location of larval development and pupation, confirm sexual dimorphism of adults, and determine the duration of development under laboratory conditions. Additional importation of candidates for further study will be made in 2011.