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parrpd@ornl.gov

Wildland Weeds

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The mission of the Exotic Pest Plant Councils is to support the management of invasive exotic plants in natural areas by providing a forum for the exchange of scientific, educational and technical information.

An **exotic plant** has been introduced, either purposefully or accidentally, from outside of its natural range. A **naturalized exotic plant** is one that sustains itself outside of cultivation (it is still exotic; it has not "become" native). An **invasive exotic plant** not only has become naturalized, but it is expanding its range in native plant communities.

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Direct all editorial and advertising inquiries to:
Karen Brown, Editor
Wildland Weeds
7922 NW 71st Street
Gainesville, FL 32653
352/273-3667; FAX 352/392-3462
kpbrown@ufl.edu

Please contact your EPPC chapter secretary for mailing address changes: www.se-eppc.org

On the Cover:

Ardisia japonica — Established and spreading in the wild in Florida. Photo by Erika Simons. See article p. 4.

Ardisia japonica –
Established and Spreading in the Wild in Florida

by Robert Simons

The genus *Ardisia* is well known to Florida natural area land managers. One native species (*A. escallonioides*) is common in southern and central peninsular Florida, and two introduced species have been designated as FLEPPC Category I invasive plant species (*A. elliptica* and *A. crenata*).

Another species, *Ardisia japonica* (often called Japanese ardisia in the horticultural trade) can be purchased from nurseries scattered about the United States, and has been cultivated locally (Alachua County, Florida) at San Felasco Nursery and at Kanapaha Botanical Garden. It has never previously been reported to escape from cultivation and establish populations in the wild.

On November 1, 2008, Cara Gwalthney (Florida Park Service District 2) and I discovered three patches of *Ardisia japonica* in San Felasco Hammock Preserve State Park and had samples identified by Kent Perkins at the University of Florida herbarium. The patches ranged from approximately 6 meters to 60 meters in diameter and were roughly circular in shape. They were not connected to or near each other or any other populations of the species, and thus appeared to have either originated from seed or to have been planted. San Felasco Hammock Preserve State Park is located less than one mile east of I-75. San Felasco Nursery was located for many years about one mile east of this infestation. Kanapaha Botanical Garden is more than 4 miles distant. This species is still grown and sold at the nursery, which has now moved to a location about one mile west of I-75, but the species no longer occurs at Kanapaha Botanical Garden, having been eliminated, according to director Don Goodman, because it appeared to be too invasive to be safely grown there.

Ardisia japonica has also been found in natural areas within the city limits of Gainesville. Two infestations were discovered by Geoff Parks in mature upland hardwood forest south of the Loblolly Nature Center on the west side of the Hogtown Creek floodplain in Gainesville, Florida, and have been measured and recorded using GPS coordinates.

The habitat that has been invaded in all cases is upland southern hardwood forest on fertile soil. The dominant trees are *Carya glabra, Liquidambar styraciflua, Quercus michauxii, Quercus laurifolia/hemispherica, Quercus nigra, Ulmus alata, Celtis laevigata, Fraxinus americana, Pinus glabra, Magnolia grandiflora,* and *Ostrya virginiana.* Common ground cover plants include *Carex* spp., *Thelypteris* spp., *Oplismenus setarius, Rivina humilis, Viola floridan,* and *Viola walteri*. These sites are some of the best examples of this forest type in Florida. The San Felasco Hammock site has never been

The appearance of *Ardisia japonica* is distinct from other species of Ardisia that are reported to occur in the wild in Florida. *Ardisia japonica* spreads as a cluster of low, slender stems less than one foot tall that have no branches above ground. It has dull, rough-textured leaves. The berries, which are red, occur singly next to the stem, and are usually not abundant. The other three species (*A. elliptica, A. crenata*, and *A. escallonioides*) grow much taller (over waist high in the case of *Ardisia crenata* and over head high for the other two species) with thicker stems that have branches. They have smooth, leathery, simple leaves, and have clusters of berries held out away from the main stem. The fruit of *A. escallonioides* and *A. elliptica* turns black when ripe.

cleared, farmed, or otherwise highly disturbed. Past disturbances include winds of near hurricane strength in September of 2004 from two hurricanes that passed nearby, and selective logging prior to 1964.

Most of San Felasco Hammock is relatively free of invasive exotic plants. However, the 300 acre area south of Millhopper Road has a significant population of *Ardisia crenata* (coral ardisia). In addition, along the east boundary adjacent to a subdivision, *Tradescantia fluminensis* (small-leaf spiderwort) and *Trachelospermum jasminoides* (Confederate jasmine) are invading by spreading vegetatively from the home sites. It was along this east boundary, while in the process of spraying the other exotic plants, that the *Ardisia japonica* populations were found.

The patches of *Ardisia japonica* range from not very dense in dense shade to very dense in partial shade. The height of the plants is 1 to 3 decimeters. As of May 1, 2009, twelve separate patches have been located, measured, and recorded with GPS coordinates. Based on the random and wide scattering of these patches, it appears that most of them – and in my opinion, probably all – have originated by seed. Fruits are being sparingly produced in the San Felasco populations, and the patches are of various sizes, indicating a wide range of estimated time of origin of the individual patches. The patches appear to be healthy and are spreading vegetatively, eliminating the native ground cover plants as they spread.

According to various internet sources, *Ardisia japonica* grows throughout southern states, from South Carolina to Texas. Land managers in this region – as well as those in northern Florida – should be aware of this plant. The two current FLEPPC Category I *Ardisia* species have become major problems in Florida, and are not easy to control. Let's hope that *Ardisia japonica* does not follow in their path.

All photos by Erika Simons. Photos show the form of the plant and its underground stem, the general appearance of a patch, and the plants with fruit.

Robert Simons is a member of the FLEPPC Plant List Committee and a retired consultant in ecology and forestry; rsimons@cox.net

IT'S OFFICIAL —

Wild Sugarcane (*Saccharum spontaneum* (L.), Another New Invasive Plant for Florida

by Mike Bodle

PHOTOS BY THE AUTHOR EXCEPT WHERE NOTED OTHERWISE

Wild sugarcane, Saccharum spontaneum *(L.)*

The University of South Florida Herbarium has made it official: we've got wild sugarcane (*Saccharum spontaneum*) in Florida on Lake Okeechobee's eastern shore (Kunzer, pers. comm.). Although it has been casually reported for years, it had not been previously collected and officially identified in Florida.

Wild sugarcane was found along the Lake Okeechobee shoreline and the outer "toe-ditch" of the Herbert Hoover Dike, which surrounds the lake. This area of South Florida includes the 700,000 acre Everglades Agricultural Area where vast plantings of agricultural cultivars of sugarcane (*Saccharum officinarum*) yielded about one-half of the 3.4 million tons of raw sugar production in the United States in 2008 (USDA Farm Service Agency, 2008).

The wild sugarcane was collected near Canal Point, adjacent to the USDA Sugarcane field station where the plant has been used in the cross-breeding of agricultural cultivars. These two plants have been cross-bred for centuries throughout the world in order to increase sugar yields, to enhance disease resistance and to enable sugarcane cultivars to regrow from roots after the stems have been cut. This regrowth is termed "rattooning" (Dillon *et al.*, 2007). The ability to generate additional crops via rattoon is a boon to sugarcane agriculture since the plant typically does not produce fertile seed.

Wild sugarcane is native to Southeast Asia, where it reportedly forms dense monocultures on seasonally-exposed riverbeds and other disturbed soils, tolerating a range of dry to flooded conditions. It reaches heights of three meters with spreading rhizomatous roots. The slender culms (stalks) are much narrower than agricultural sugarcane. The stalks may be green-grey, ivory or white. Its plume-like inflorescence varies in length and may be grey-white to purplish-white (see photo). The inflorescence and foliage also are smaller than those of agricultural sugarcane. The upper leaf mid-vein is white. It has a membranous ligule topped with scattered hairs. Wild sugarcane is very disease resistant but yields very little sugar.

Ethnobotanically, wild sugarcane reportedly serves as a laxative, anti-gonorrheal and a sexual stimulant. It also is used in the treatment of burning sensations, bladder stones, blood disorders, constipation and liver troubles. In Asia, many common names exist for the plant in several languages including Hindu "kush" and Bengali "kans" (Oudia, 2003).

In its native South Asia, wild sugarcane ranges from tropical to subtropical climates. It is reported as invasive in French Polynesia, Guam, Hawai'i, Puerto Rico and many other tropical locales (PIER, 2007). Although not officially vouchered, it seems likely that the plant is present in other sugar-producing states, i.e., Texas, Louisiana, Mississippi and Alabama. It is my conjecture that it may be mistaken for *S. officinarum* in these states, and this may have been the situation in Florida for some years.

Saccharum spontaneum is listed as a Federal Noxious Weed (USDA-APHIS, 2006). It is also prohibited by many states including, oddly, Massachusetts and Minnesota, where it almost certainly is not present and could not perpetuate. These precautionary listings reflect wild sugarcane's weedy reputation, although it is not included by Holm *et al.* (1991) among the world's worst weeds. The exclusion by this fairly authoritative compendium of the world's most-reported weeds is consistent with its limited weediness around Lake Okeechobee. In this area, it comprises a minor component of the littoral/ditchbank plant community. Other weedy grasses dominate, including common reed (*Phragmites australis*) and guinea grass (*Pennisetum purpureum*).

Because it is listed as a Federal Noxious Weed, there may be greater interest in controlling wild sugarcane despite its somewhat secondary invasive behavior in South Florida. Varying degrees of control have been reported by digging rhizomes, chopping rhi-

zomes with subsequent herbicide treatments, and shading (Tayade and Satao, 2004; Kim *et al.*, 2008). In the mid-1990s, initial treatments using single applications of glyphosate in the Canal Point area did not eliminate the plant.

Mike Bodle, Senior scientist, South Florida Water Management District, West Palm Beach, FL, mbodle@sfwmd.gov

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Wild sugarcane inflorescence.

PHOTO BY SCOTT BAUER, USDA AGRICULTURAL RESEARCH SERVICE, UNITED STATES, BUGWOOD.ORG

The agriculturally grown sugarcane cultivar, Saccharum officinarum. *Sugarcane inflorescences are much broader and larger than those of wild sugarcane.*

The upper leaf mid-vein is white in wild sugarcane.

The conspicuous ligule of wild sugarcane consists of stiff hairs.

From Crop to Weed – Natalgrass in Florida

by Courtney Stokes

Natalgrass (*Melinis repens*, formerly *Rhynchelytrum repens* and, even earlier, *Tricholaena repens* Nees), is a grass native to southern Africa that is becoming more widespread and invasive in Florida. Introduced to the United States as early as 1866 as an ornamental, it was noted to thrive in Florida's moderate, subtropical climate and well-drained, sandy soils. Natalgrass was evaluated as a forage plant in the U.S. Department of Agriculture trial gardens as early as 1878. Additional seed was sent to Florida from Brazil, Australia, India and Hawaii in the 1880s and 1890s, presumably for use as a forage grass. It was noted very early that the plants spread from each area of planting (Tracy, 1916). Beginning in 1892, natalgrass was promoted as a forage by the Florida Agricultural Experiment Station (Mislevy and Quesenberry, 1999) and, by 1916, the U.S. Department of Agriculture reported over 40,000 acres cultivated for hay in Florida. Lake and Marion counties each had 10,000 acres in 1915, while Sumter and Pasco counties had 3,000 acres each. Hillsborough and DeSoto counties reported over 2,000 acres each, and smaller populations could be found in other counties (Tracy, 1916). However, natalgrass is low-yielding and has poor nutritive value. Agricultural production eventually ceased when better forages were introduced or developed. Today, natalgrass is still occasionally sold as an ornamental, but is most noted for its weedy properties. Since its early evaluation as a forage species there has been little research published on natalgrass. In recent years there has been increased interest in natalgrass as land managers struggle to eliminate the plant from natural areas.

Natalgrass infestation in Polk County, Florida

Biology

Natalgrass is an annual to semi-perennial plant with branching culms that root at the nodes. Plants grow from erect clumps to 3 to 4 feet in height and have linear leaves that are 8 to 12 inches in length. The ligule (where the leaf joins the stem) has a rosy pubescent fringe that is a distinguishing characteristic of natalgrass. New leaves are lime to bright green, but turn a reddish or purplish color as they mature. The seed head is a panicle 4 to 8 inches long, pink to purple in color, with reddish hairs that turn silvery gray as the seeds mature. Mature seed dispersal begins approximately two weeks after flowering. Seeds do not germinate well when first shed, but after an after-ripening period, germinate in less than 24 hours when exposed to water. A mature plant typically has multiple seed heads and produces seed year-round. Windborne seeds often collect on the ground in a layer that may be several inches thick. Seeds will germinate at temperatures of 20 degrees C and greater.

Natalgrass will perenniate if it is not exposed to long periods of freezing temperatures. While short periods of freezing temperatures (such as an overnight freeze) cause only temporary damage, extended periods of freezing temperatures will kill the plant. Natalgrass has been reported as far north as Maryland, but it is much more prolific and likely to be perennial in Florida's moderate climate.

Impacts

In the United States, natalgrass can be found throughout Florida and Hawaii, with scattered populations reported in many other southern states. It is a FLEPPC Category I invasive plant (2007). Natalgrass most commonly invades disturbed

areas and roadsides, though research has shown that it invades undisturbed natural areas and South Florida's pine rocklands (Possley and Maschinski, 2006). Natalgrass infestations have become a major hindrance to the restoration of native species after disturbances such as phosphate mining, commonly colonizing these sites following the eradication of other invasive species. Natalgrass competes with native plants for nutrients, light, water and space, and prevents colonization by native species. In fact, its invasive potential was noted in 1916 when Tracy reported its value as a "smother crop," which "makes such vigorous growth as to choke out most other grasses and weeds." When grown in citrus groves, it outcompeted sandspurs (*Cenchrus* sp.) and produced a hay crop yielding three cuttings of forage of 2-3 tons/acre annually (Tracy, 1916). Small populations of natalgrass are present throughout the state, and can quickly colonize a void left by the control of other species.

Natalgrass seedhead

Management

The most effective method of controlling natalgrass is preventative. Any nearby seed source should be eliminated before large-scale control of another exotic species. Establishing a good ground cover also appears to help prevent natalgrass spread.

Natalgrass is readily controlled by tillage, and is not a weed in agronomic settings (Tracy, 1916). Control is much more difficult in natural areas, where tillage is often not an option. Fire does not offer long-term control, and may actually provide an advantage by creating disturbed areas that are quickly colonized from seed.

Foliar application of 1-2% glyphosate or a broadcast rate of 2-3 lbs-ai/acre will provide control, as will imazapyr with a 0.5-1% solution or a broadcast rate of 0.25-0.375 lbs-ai/acre. Glyphosate control is a short-term solution, because regrowth from seed is rapid. Research plots sprayed with glyphosate at Tenoroc Fish Management Area initially showed good control, but had more natalgrass after several months than before the treatment. In addition, native species were no longer present in the treated areas. Imazapyr provides residual control, preventing natalgrass reinfestation, but also prevents re-establishment of most native species. If possible, treatments should be applied when flowering and seed set is at a minimum. Preliminary research suggests that imazapic provides good control. Wiregrass (*Aristida stricta*) is reported as tolerant to this herbicide, along with *Andropogon, Liatris* and *Eragrostis* species (Kluson *et al*, 2000). Imazapic should be applied at 0.25-0.5 lbs-ai/acre.

[above] Natalgrass in Lake County, Florida; [right] Natalgrass seeds carpet the ground.

Research is continuing to evaluate natalgrass biology and management options.

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Courtney Stokes is a graduate student in the University of Florida-IFAS Agronomy Department. courtnet@ufl.edu

Cerulean Flaxlily –

An Invasive Plant in Highlands Hammock State Park

by Elizabeth A. Gandy, Jeffrey T. Hutchinson, and Kenneth A. Langeland

Introduction

The cerulean flaxlily, *Dianella ensifolia*, is a perennial evergreen native to Australia, Southeast Asia, and Africa. It is also called dianella lily, flax-lily, umbrella dracaena, Benjuang, and sagatit. Although it is not prohibited by the State of Florida or listed by the Florida Exotic Pest Plant Council, it has been documented in natural areas of Highlands and Miami-Dade Counties in Florida. The largest known infestation in the state occurs in Highlands Hammock State Park, located in Sebring, Highlands County, in central Florida. Cerulean flaxlily currently infests or occurs in over 100 acres of the park.

Belonging to the family Hemerocallidaceae, the genus *Dianella* consists of about 181 species, forms and varieties worldwide. The cultivated variegated flaxlily (*Dianella tasmanica* 'Variegata') is commonly planted in Florida landscapes. Other species of this genus also have been cultivated and hybridized and are widely utilized in landscape settings. It is not uncommon to find *Dianella* species and cultivars promoted as "Florida friendly" landscape plants. Some forms or varieties of the cerulean flaxlily include *D. ensifolia* f. *albiflora*, *D. ensifolia* f. *aureovariegata*, *D. ensifolia* f. *racemulifera*, and *D. ensifolia* f. *straminea.* Common names of cultivars include border gold, border silver, Darwingold and sougold. Cultivars differ in coloration patterns or form in leaf variegation. The taxonomy of *Dianella* is still unclear as little research has been conducted on this genus.

Cerulean flaxlily has compressed flattened stems. Leaves have parallel venation with finely serrated margins. The serrations may only be visible on one margin of the leaf. The terminal florets form a panicle which grows beyond the height of the lily by about 0.25 m. The perfect flowers have three sepals and three petals and are white with a yellowish tint. Fruits are succulent, bright, violet-blue berries typically containing five shiny, black seeds. While the plant flowers and fruits most prolifically during the warm months of the year, some flowers and fruit can be present on plants throughout the year. The pulp of the berries is high in carbohydrates. It is eaten by some birds in their native habitat, which results in the spread of seeds. The seeds have been used as a natural rodenticide and are reported to be toxic to livestock, which indicates they are not likely to be dispersed by most mammals (Wang, 1984).

Propagation of the plant is by vegetative growth or seed. In its native range, the cerulean flaxlily occurs in open shrubland, evergreen rainforests, wet pinelands, coastal dunes, sandbars, grasslands and open lowland forests, from sea level to 1600 m. It occurs in a wide variety of niches in both temperate to tropical climates, and proliferates in open or shaded habitats. It seems to tolerate a wide range of temperature, light, moisture, soils and elevation. In

Highlands Hammock State Park (HHSP), we have observed it as an epiphyte on sabal palms. The very broad range of climatic tolerance of this plant demonstrates a potential threat for spread into other areas of Florida and the southeastern United States.

Some ethnobotanical uses of the cerulean flaxlily include treatment of intestinal worms, post-partum aides, poultices, ointments (boils, itching, rheumatism), fatigue, cosmetics, perfume, incense and rodent control.

Cerulean flaxlily is not prohibited by the State of Florida nor is it included on the Florida Exotic Pest Plant Council's 2007 List of Invasive Plant Species. Betrock's PlantFinder magazine (October 2008) listed thirteen species and cultivars of *Dianella* available from more than forty nurseries. In a Sun-Sentinel article (http://www.sun-sentinel.com, January 29, 2006), a landscape designer suggested planting *D. ensifolia* as one of many possible alternatives to planting trees vulnerable to hurricane damage. The University of Florida IFAS Assessment of Non-Native Plants in Florida's Natural Areas (http://plants.ifas.ufl.edu/assessment/) currently lacks the required three experts for each zone to produce a complete assessment.

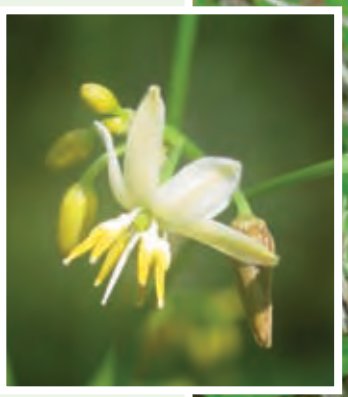
A Problematic Species in Highlands Hammock State Park

The cerulean flaxlily has been documented in natural areas of Highlands and Miami-Dade Counties in Florida. It is not known if the species is spreading in Miami-Dade County. The largest known infestation in Florida occurs in Highlands Hammock State Park,

located in Sebring, Highlands County. When the property was first dedicated as a state park in 1936, a small portion of the site was a botanical garden. Records in the park's Civilian Conservation Corps museum document all the plants introduced into the botanical gardens prior to 1936, including *D. ensifolia* and more than thirty other lilies.

Even though the cerulean flaxlily has been present at the park for decades, there is no historical mention of the plant being invasive there. Despite being well surveyed by botanists over the years, the park's species lists do not include *D. ensifolia* as invading the natural areas until park naturalist Carol Beck included it in 1962.

Over the past 10 years, park staff noted that cerulean flaxlily was becoming more common and spreading from its original location in the footprint of the botanical garden. After a lag time of about 60 years, the population seemed to reach a critical mass and is now expanding rapidly. Cerulean flaxlily currently infests or occurs in over 100 acres of the park. Observations following the 2007-2008 winter season showed heavy damage to the plants, which may have been caused by the low temperatures experienced locally. The warmer winter trend of the past decade may be a contributing factor to the plant's rapid expansion.



The epicenter of the cerulean flaxlily park infestation is the hammock area north, west, and south of the campground. In these areas, the plant forms a dense groundcover that excludes native herbs, grasses, and ferns that typically characterize the substrata of a hydric hammock. The annual, perennial and deciduous native ground cover appears incapable of competing with the robust, evergreen flaxlily. In dense areas where flaxlily infestations are high, native plant cover is often < 10%.

Cerulean flaxlily spreads most quickly by vegetative propagation. However, individual plants have been found at great distances from the epicenter on recently acquired parcels of the park in seepage slope, mesic pine flatwoods, and even scrub communities, suggesting that it also spreads by seed and that it tolerates a wide range of environmental conditions. The flaxlily also has been found in areas where cutthroat grass, an endemic species, occurs. Despite the toxicity of the fruit, it is presumed that wildlife consume it and facilitate seed dispersal since single plants have been documented far from known populations. Plantlets and fruit also can be spread on vehicles and equipment during routine use throughout the park. Park staff recently observed the plant growing within the city of Sebring.

The ability of the flaxlily to colonize any unsaturated habitat type is of critical concern. The most newly invaded habitat at the park is the mesic pine flatwood community south and west of the hammock epicenter. Prescribed fire staff report that the plant does not burn well, but it is quick to expand into recently burned areas before native vegetation can recover. It is possible that fire scarifies the seeds and increases germination rates. Infestation of cerulean flaxlily in fire dependent communities may severely alter fire behavior and community structure.

Past control efforts have consisted of both herbicide treatment and mechanical removal. No single treatment has proven successful. Regrowth from underground rhizomes has required multiple treatments. Non-target damage to any desirable native vegetation also is of great concern as native species are critical to restoring infested areas.

Ongoing Research to Control Cerulean Flaxlily

In November 2007, herbicide screening trials were initiated using eight herbicides (Table 1). The goal was to find the appropriate rate and combination of herbicides to control cerulean flaxlily with the fewest number of treatments and the least amount of non-target damage. Plots were retreated after 6 months. During evaluations conducted three months after the initial treatments, we found promising results with Vista (93% reduction) and a tank mix of 1.5% Rodeo + 1.5% Renovate 3 (91% reduction).

During evaluations conducted six-months after treatments, we observed that only Habitat (imazapyr) provided acceptable results with >95% reduction in cover and no re-growth. It was somewhat surprising to observe 25-50% re-growth in plots treated with Vista

and with Rodeo + Renovate 3, since our three month evaluation indicated high mortality of cerulean flaxlily. This reminds us that controlling dense infestations of invasive plants requires long term monitoring. Escort XP, which targets and blocks the same enzyme in plants as Habitat, provided 89% reduction at six months but some regrowth was observed. No other herbicides from the first trials were effective in reducing the cover of flax lily.

Based on results of our initial research, we initiated additional experiments in the greenhouse using three rates of the most promising herbicides: Habitat, Escort XP, Vista, Rodeo, and Renovate 3, either alone or in tank mixes (Table 2). These herbicides also were applied in the field at one rate during September 2008.

Table 1. Treatments used during initial herbicide screening trials in November 2007.

Herbicide	Product name	Rate
Aminopyralid	Milestone	0.13% product
Asulam	Asulam	1.00% product
Fluroxypyr	Vista	0.80% product
Glyphosate	Rodeo	3.00% product
Glyphosate + triclopyr	Rodeo + Renovate 3	1.50% product (each)
Imazapic	Plateau	1.50% product
Imazapyr	Habitat	1.00% product
Metsulfuron methyl	Escort XP	2.00 oz / 100 gallon
Triclopyr	Renovate 3	3.00% product

Conclusions and Future Plans

We observed >95% control and no regrowth at six months post-treatment using 1% Habitat (imazapyr). No other herbicide or tank mix tested was as effective and regrowth was observed at six months. We are concerned about using Habitat on large-scale treatments due to potential damage to native shrubs and trees, but hypothesize that using lower rates of Habitat in tank mixes of Rodeo or Renovate 3 may provide enough control to prevent regrowth. We are currently testing Habitat alone at three rates, and at lower rates in tank mixes with Rodeo or Renovate 3. In addition, we are testing Escort XP alone at three rates, and a tank mix of Vista and Rodeo at three rates in greenhouse and field screening trials.

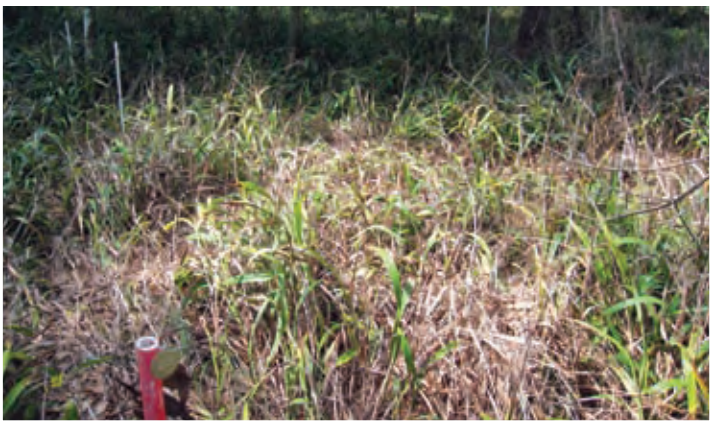
Our initial herbicide trials indicate that cerulean flaxlily is very difficult to eliminate from natural areas. Due to the plant's underground rhizomes, it is likely that several herbicide treatments and long term monitoring will be required for control.

Although cerulean flaxlily currently has a limited range, its spread at Highlands Hammock State Park and its life history indicate invasive potential at nearly any point of introduction. Eradication of this plant in the park is important to stop its potential spread into other areas of Florida.

5x5 m plot pre-treatment (Habitat)

5x5 m plot six months post-treatment (Habitat)

5x5 m plot pre-treatment (Escort XP)



5x5 m plot six months post-treatment (Escort XP)

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Table 2. Treatments used for greenhouse trials. Asterisks indicate herbicide trials replicated in the field in September 2008.

Herbicide	Product name	Rate
Imazapyr	Habitat	0.50% product 1.00% product 2.00% product *
Metsulfuron methyl	Escort XP	1.00 oz / 100 gallon 2.00 oz / 100 gallon 4.00 oz / 100 gallon *
Imazapyr + glyphosate	Habitat + Rodeo	0.10% + 3.00% product 0.25% + 3.00% product * 0.50% + 3.00% product
Imazapyr + triclopyr	Habitat + Renovate 3	0.10% + 3.00% product 0.25% + 3.00% product * 0.50% + 3.00% product
Fluroxypyr + glyphosate	Vista + Rodeo	0.20% + 3.00% product 0.40% + 3.00% product * 0.80% + 3.00% product

Acknowledgements

We would like to thank Peter Anderson (park manager), Jeanne Parks (assistant park manager) and staff at HHSP for offering logistical advice and allowing us to conduct herbicide screening in the park. We would also like to acknowledge Donna Watkins with the Florida Park Service for her initial involvement in the project.

Elizabeth A. Gandy, District Biologist, Florida Park Service, Osprey, FL. Elizabeth.gandy@dep.state.fl.us

Jeffrey T. Hutchinson, Graduate Student, Center for Aquatic and Invasive Plants, Department of Agronomy, University of Florida, Gainesville. jthutch@ufl.edu

Kenneth A. Langeland, Professor, Center for Aquatic and Invasive Plants, Department of Agronomy, University of Florida, Gainesville. gator8@ufl.edu

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Tough Habit to Break

Elephant grass (Pennisetum purpureum) UF-IFAS, CENTER FOR AQUATIC & INVASIVE PLANTS

by Jim Burch

Crops that can be harvested as renewable sources of energy are currently of great interest to the world's agricultural and other business communities. Florida is well suited for agriculture, but crops considered as biofuels often are not native to this state, so that large-scale growth of exotic plants is a significant possibility. Curiously, a similar move to import plants was underway about one hundred years ago, and this contributed to the costly exotic plant invasions with which we contend today. The twentieth century philosopher Santayana suggested, "Habit is stronger than reason." Are we about to try this experiment again?

Plants as Alternative Energy Sources

Unless you have been living on a raft, you know that petroleum products have generated a lot of attention with recent price increases. At some level we knew this would happen, with more demand for energy and increasingly inaccessible resources. We have been instructed from grade school that energy resources are finite, and that someday they would be in short supply. This concept is easy to understand, but difficult to recognize until the squeeze is really on and our wallets are pinched.

Most of the energy we use originated as solar electromagnetic energy (light). Long ago, photosynthetic autotrophs, and later plants, evolved the chemical process of photosynthesis in response to available light energy. By temporarily winding entropy backwards, photosynthesis allows energy to be sequestered and synthesized into useable, energy-rich compounds. This process is the basis of most food webs, forests, and oil fields. Using the energy stored in plants to supplement our power sources is an attractive alternative to fossil fuels.

The idea of using renewable, self-sustaining plants to gather our energy makes sense, but many related things should be considered. Several different plant species have been touted as new biofuel resources. The plants of interest all have high rates of carbon sequestration, are fast growing, require little care, and generally thrive in conditions adverse to other plants. These plants are quickly renewable and efficiently gather solar radiation, converting it to carbon-based energy-carrying compounds that we can use.

Non-native plants, however, carry potential problems when associated with native biological communities. This can be especially true with grasses. The Florida Exotic Pest Plant Council's (FLEPPC) 2007 List of Invasive Plant Species indicates seven Category I and four Category II plants that are grasses. The Pacific Risk Assessment Evaluations (U.S. Forest Service 2007) lists 224 exotic grasses in the Pacific Islands area, including Hawaii and Australia. Of these, 72 were evaluated for risk of invasiveness on the islands; 57 (79.2%) were rated "high risk", 5 (6.9%) were rated "low risk", and 10 (13.9%) require further study. Some grasses are tenacious, competitive, and displace natives where they are introduced; it is appropriate that caution and vigilance accompany these introductions.

A Few Candidate Plants

Development of useable material from plants usually involves the production of fuel to power electric generators or other combustion-driven machinery. Common methods include production of ethanol by fermentation of sugars, production of bio-oil, or production of cellulose-based biomass. All of these may be used as fuel to produce heat, and subsequent mechanical

energy. Several plants have been considered as renewable energy resources; many of these are exotic grasses.

Elephant grass (*Pennisetum purpureum*) contains little sugar in its tissues but it can be converted to bio-oil by pyrogenic processes with charcoal left over, both of which can be used as fuel.

Sugarcane (*Saccharum officinarum*) may not be as effective an energy source as other grasses. Duke (1983), citing others, questioned the efficacy of ethanol production as an energy source; this study is 25 years old, so that more recent information should be considered. However, the comparisons cited in this study were based on energy requirements to produce ethanol, which presumably have not changed. If this is true, the yield of ethanol energy is low considering the energy required for production.

Arundo (*Arundo donax*) grows rapidly but does not produce seeds. Herbivory is practically unknown for this plant. This grass also produces fibers that can be used to produce high quality paper. Although proponents of arundo as biofuel claim that a six-year evaluation in Florida indicated no invasive tendencies (Schill 2009), land managers in Florida show great concern. At least one company has indicated serious interest in producing biomass fuel for power plants from over 20,000 acres of planted arundo; arundo has become invasive in California, Texas and elsewhere where water-borne vegetative propagules became established in large areas. Even if arundo is planted in dry areas of Florida, this state is prone to hurricanes that could blow plant fragments to wet areas. This grass is a major concern in California because it can change fire regimes and displace native plant communities that affect approximately ten animal species listed for protection (Dudley undated). Spencer et al (2008) found that arundo plants from Florida, Texas, and California grew equally well under similar conditions, and no differences in growth characteristics were found that would suggest different invasive potential and impact on resident species. The Florida Native Plant Society (www.fnps.org) produced a lengthy and well-researched policy statement opposing the use of arundo as a bio-energy crop, based on its invasive potential and histories in other areas.

Jatropha (*Jatropha curcas*), a broad-leaf Euphorb, yields oil from its seeds, so that bio-diesel or other oil products can be produced. However, this plant is poisonous to humans, and is invasive in many biological communities. Australia has banned the plant since 2006, citing potential environmental problems. The yield of useable products from this plant is attractive, but it requires significant labor to produce. Until this is overcome, large scale production is questionable.

Category I Invasive, Florida Exotic Pest Plant Council (FLEPPC): invasive exotics which are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.

Category II Invasive, FLEPPC: invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I if ecological damage is demonstrated.

Fairchild and Other Plant Importers

About one hundred years ago a similar move to import plants into Florida, and the United States in general, occurred. The idea was to improve agricultural production by capitalizing on crop attributes found in plants from other areas. This, in part, led to some of the exotic plant management problems we now confront.

David Fairchild's autobiography (Fairchild 1938) on many pages reads like a "Who's Who" of early Miami pioneer families, world famous travelers, scientists, and plant importers. Fairchild was perhaps the best known of the plant explorers, and in the early 1900s he was appointed Agricultural Explorer in Charge for the Foreign Seed and Plant Introduction section of the U.S. Department of Agriculture, a position he held for over twenty years. As part of the responsibilities associated with this position, he administered several plant introduction stations in the United States and in a few other countries, as well. These facilities dealt with importing plants from around the world, and studying them to determine what characters would be most advantageous for propagation and harvest in this country. A few were in the Miami area, including the well known Chapman Field Plant Introduction Facility on Old Cutler Road, which primarily dealt with tropical plants.

Much of the imported plant material was selected because it demonstrated promise for improving agriculture in the United States. At the time much of the United States was still culturally and economically associated with agriculture, so that improving crops or developing new agriculture was a reasonable and essential activity; importing plants with desirable qualities for agriculture made sense. Also, a need for rubber was developing in the 1900s with the advent of automobiles, and this became particularly important as part of national security in the years leading to U.S. involvement in WW I. Several candidate plants associated with rubber production were imported. This likely opened possibilities for consideration and import of other tropical crop plants. In general, the plants that were brought in offered increased quantity and diversity of food production, higher quality feed for livestock, building and manufacturing materials, and other products consumed or sold. Importing these plants was a good idea at the time.

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General Category	Temperate Origin	Tropical Origin	Total	Percent
Forage Crops	343	115	458	30.6
Agricultural Crops	414	370	784	52.4
Landscape	37	69	106	7.1
House Plants	4	1	5	0.3
Textiles and dyes	10	8	18	1.2
Medicine	16	7	23	1.5
Construction, forestry	29	47	76	5.1
Cosmetics	0	4	4	0.3
Research	4	19	23	1.5
Total	857	640	1497	100

Table 1. General categories of plants introduced into the United States in 1909. A total of 1,497 plant introductions into the United States occurred in 1909 and many of these were of materials with tropical origins that may have been introduced to facilities in Florida. Most of these plants were crop or forage candidates, but a few were possible landscape or other uses.

Fairchild wrote exuberantly about the virtues of *Casuarina* spp. (two species now on the FLEPPC Category I list; one species on the FLEPPC Category II list), Brazilian pepper (Category I), kudzu (Category I), and other imports. He made equally positive comments on many other plants that have become valuable to agriculture, or have not become invasive. Attention was given to the FLEPPC-listed species paragrass (*Urochloa mutica*), and rubbervine (*Cryptostegia madagascariensis*), and other plants as potential Everglades colonizers. An area dominated by cajeput (*Melaleuca quinquenervia*) (Category I) was described as a previously small population in Dade County, started only a few years before, that had grown and expanded to cover many acres, smothering a citrus grove; the plant explorer mused that the individual who might first transplant these trees for sale would be favorably received as a discoverer.

S. H. Richmond warned that *Leucaena leucocephala* (Category II) would become a weed in southern Florida (Fairchild 1938) and by the 1930s it had, but Fairchild minimized this because, as a legume, it enriches the soil, and the tree produces good firewood. This tree is now marginally invasive in southern Florida, but enormously problematic on many Caribbean islands. Clearly, the idea of ecological perturbations caused by exotic plant populations in Florida was not well developed in the early twentieth century and, if it was considered, it seems that the anticipated benefits outweighed potential problems.

The plant importers did their jobs well and documented the arrival of thousands of propagules from hundreds of plant types annually for many years; in part of 1914 they averaged thirteen introductions per day. One hundred years ago (1909) the U. S. Department of Agriculture Bureau of Plant Industry records indicate that 1,497 introductions were made (sequential numbering of records suggests that over 1,600 introductions occurred, but a count of introductions totaled 1,497). Eighty-three percent of the plants introduced were associated with agriculture and forage crop improvements; another 8 percent were associated with the textile industry, medicine, and construction or forestry industries, so that well over ninety percent of plant imports were associated with tangible goods and services. The remaining plants that were imported were used for aesthetic enhancements, and a few were brought in for research, as some potential was noted for characters possessed by these plants.

About 43 percent of imports in 1909 had a tropical affinity, so that many of these were likely to have arrived in Florida (southern California also received some of these imports). Of these, at least two now are classified as FLEPPC Category I invasives, and three plants are classified as Category II. The number of imported plants that may be invasive in other states is not determined here.

Conclusion

About a century ago, we imported plants from around the world with an eye toward improving things for society. Now we may question the value of those actions. Sharp-penciled accounting can indicate the money involved, but it is not easy to assign dollar amounts to changes in natural areas that also occurred. Clearly, our society has a need for different sources of energy, and several agricultural crops have potential here in Florida. The importation of plants for energy production differs from previous plant import strategies, as comparatively fewer species are being considered. Nevertheless, these potential introductions beg caution. We confront the possibility of massive propagation of large, non-native grasses and other plants as energy sources. With the interest in producing energy-related plant products, the question, "Will it be worth it?" is reasonable. The twentieth century philosopher Santayana also stated: "Those who do not remember the past are condemned to repeat it."

Jim Burch is the Resources Management Supervisory Botanist at Big Cypress National Preserve and oversees the exotic plant management program. He is Chair-elect of the Florida Exotic Pest Plant Council. Jim_Burch@nps.gov

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SE-EPPC and EPPC Chapter Symposia Report

South Carolina EPPC recently hosted the 11th Annual SE-EPPC Symposium in historic Georgetown, SC (May 14-17). The Southeast EPPC board of directors is grateful for the hard work put forth by John Brubaker, SC-EPPC President, Colette DeGarady, Treasurer, and Robin Mackie, USDA Forest Service. Approximately 100 participants heard some truly informative presentations ranging from the effects of invasive plant infestations on real estate values to the honest lack of awareness of invasives from many commercial growers in the nursery industry, creating a challenge to EPPC members to make use of this new-found knowledge. The sumptious social at the meeting site and traditional low-country boil dinner at the historic Belle Baruch home site on Hobcaw Barony provided plenty of opportunity for meeting new colleagues and sharing invasive plant experiences. Field trips included the Cape Romaine National Wildlife Refuge, Mepkin Abbey and the Hampton Plantation State Historic Site, and Francis Marion National Forest; workshops were provided on native plant alternatives and herbicide application methods. A couple of exciting bonuses during these excursions were roadside pitcher plants (*Sarracenia* spp.) seen alongside wet pine flatwoods, a canebrake rattlesnake viewed while en route to the banquet, and a young alligator seen crossing the road leading to the Georgetown historic district. Approximately forty invasive plant related items were offered at the lively silent auction to raise funds for SE-EPPC. Greatly appreciated financial support for the symposium was provided by the Frances P. Bunnelle Foundation, the USDA Forest Service, the National Park Service, BASF, and the USDA Natural Resources Conservation Service.

President Chuck Bargeron opened the first session by posing the question, "How can we get the public excited about the invasive plant issue?" without being viewed as extremists on either side of the political spectrum. He cited a video example of extreme environmental activism on YouTube that has received almost 700,000 hits, and The Daily Show, which humorously but effectively addressed the invasive Burmese python problem in Florida, and receives 1.5 million viewers nightly. The SE-EPPC website receives 1/2 million hits per year. Chuck also said we need the public to think of an invasive plant like cogongrass as the next boll weevil, so we can get Congress to pass an eradication program. What can we do to improve our outreach? His answer was, "We need you!" and an invitation to become involved in SE-EPPC.

SE-EPPC's 2009 Strategic Planning Objectives were reviewed and include efforts to:

- Synthesize and share state EPPC plant listing processes and protocols
- Identify regional legislative and policy issues

(top) Matt Nespeca describes some of the ongoing native plant restoration during a field trip at Mepkin Abbey in Moncks Corner, SC. (bottom) Father Guerric, director of the native plants project, provides a tour of the nursery at the monastery.

- Foster development of Cooperative Weed Management Areas (CWMAs)
- Facilitate interaction and collaboration with like-minded organizations
- Increase outreach and communication
- Recruit potential liaisons to serve on the board of directors
- Foster more interaction with the "green industry" (plant nurseries)

Help is needed on all SE-EPPC committees so please contact President Chuck Bargeron if you are interested in participating (cbargero@uga.edu)

Current major activities of SE-EPPC include:

- Annual Conferences (2009 was the 11th; at least one has occurred in each EPPC chapter state);
- Representation on the National EPPC Board – Brian Bowen serves as NAEPPC liaison;

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- Publication of *Wildland Weeds* quarterly magazine;
- EDDMapS, which incorporates data from USDA PLANTS, the USDA Forest Service, IPAMS, FLEPPC, and herbarium and citizen scientist data, using electronic reporting and notification;
- The SE-EPPC website, which had ½ million visits last year, contains invasive plant information and images, hosts the list-serve, hosts chapter websites and serves as a clearinghouse for exotic pest plant information.

Presentations

Plenary speakers and presentations were Kathy O'Reilly-Doyle, Partners for Fish and Wildlife Programs, U.S. Fish and Wildlife Service, *Think Locally, Act Neighborly*; Jack Whetstone, Belle Baruch, Clemson University, *Effective Partnerships in Georgetown County, SC — To Err is Human, To Repair takes Cooperation!* and Kari Whitley, Scout Horticultural Consulting, *Sense and Sustainability: The Impact of Ornamental Nurseries on Native, Exotic and Invasive Species*. The final plenary presentation was followed by a panel discussion, *How Can We Stop the Sale of Non-Regulated Non-Native Invasive Plant Species?* moderated by Colette DeGarady of The Nature Conservancy. Participants were Kari Whitley, Betsy Brabson (Carolinas Beach Vitex Task Force), Jen Spicer (North Inlet-Winyah Bay National Estuarine Research Reserve, Georgetown, SC), and Father Guerric Heckel (Director of Native Plant Reclamation at Mepkin Abbey, SC).

Kathy O'Reilly-Doyle spoke about innovative approaches to increase invasive plant management effectiveness and decrease costs by developing partnerships, recruiting motivated people and pooling time, talent and resources with your neighbors. She described the evolution of the Florida Invasive Species Partnership (FISP) (see *Wildland Weeds* – Winter 2008, V. 12(1):6-8) or www.floridainvasives.org). Kathy made the point that invasive species have no boundaries – they cross over natural and disturbed sites, both public and private. In order to accomplish a cohesive effort to manage plant infestations and prevent future ones, it is necessary to bring all stakeholders (public and private) to the table, develop and share information on all of the options and resources available, and work together.

Other tools described include Coordinated Invasive Species Management Areas (CISMAs) and an online matrix of Florida Landowner Incentive Programs with funding opportunities. Kathy's presentation is online at the SE-EPPC website (www.se-eppc.org) under the 11th Annual SE-EPPC Conference tab. Please view it to see all of the incredible progress they have made in creating a successful cooperative program to combat invasive pest plants in Florida.

Jack Whetstone described multiple public-private cooperative funding programs including federal, state, local and private sources combined together to target the control of several exotic plant species on a landscape basis. He showed examples of South Carolina management efforts on *Phragmites*, water hyacinth (*Eichhornia crassipes*), giant reed (*Arundo donax*), beach vitex *(Vitex rotundifolia),* alligatorweed *(Alternanthera philoxeroides)* and Chinese tallow *(Triadica sebifera)*.

Kari Whitley presented a very surprising and enlightening program. She pointed out that large wholesale nurseries, plant breeders and landscape architects determine the plants that are available for use in our landscapes, but that the species chosen are driven by consumers and plant characteristics. She described what commercial nurseries need to survive, and what consumers want and expect. Ways to educate growers, reach legislators, and encourage consumers to plant wisely were discussed, and she covered recent efforts and successes of nurseries to market native plants. She cited a Penn State University horticultural study which concluded that 80% of survey respondents would not purchase invasive species. Kari reviewed some examples of regulated aspects of the industry, citing fire ants and sudden oak death, stating that the industry will comply if they are regulated. She also reviewed what EPPCs could do to help the nursery industry behave responsibly. View her presentation at http://www.se-eppc.org/2009/sessions.html. I hope to recruit a paper from Ms Whitley for a future issue of *Wildland Weeds* magazine so that her observations can be presented in more detail.

Matt Nespeca presented an original and thought-provoking concept in *Making Invasive Plant Problems More Accessible Through Education and Outreach with Real Estate Professionals*. He stated that by quantifying the long-term effects of invasive plant infestations, opportunities for treatment could increase. We already quantify many ecosystem values (forestry, wetlands, etc). He described how invasive species can fit into this model and stated that real estate professionals need to understand these values to foster invasive plant management. Matt presented examples of real estate value losses due to invasives in other markets: in the western U.S., leafy spurge was found to reduce individual property values of rangelands by as much as 83% (Weiser, 1997); in aquatic markets, hydrilla infestations lower lake property values; with kudzu on rural forest lands, control costs can exceed net present value of land (Miller). Look for an article on this new and exciting topic in a future issue of *Wildland Weeds*.

SE-EPPC Board of Directors Meeting

At the board meeting preceding the SE-EPPC conference, Nancy Loewenstein (ALIPC) accepted the position of SE-EPPC president-elect, with her term as president to begin in May 2010 when current president Chuck Bargeron steps down. Karen Brown (FLEPPC) was elected secretary to take place immediately following the long and much-appreciated tenure of Kristin Gounaris-Allen. Chuck Bargeron reported that the SE-EPPC website receives a half million visits per year. The board is grateful for Chuck's exceptional web skills, which include the website, EDDMapS, listserve administration, online meeting registrations and speaker presentations, mailing list coordination, and so much more.

…continued on page 24

Alabama Invasive Plant Council 7th Annual Conference — Birmingham Botanical Gardens, Birmingham, AL

Held May 5th, 2009, the conference theme was *Combating Invasive Plants in a Sustainable Landscape* and had 145 participants. Presentations included many talks on invasive plants from the Huntsville Botanical Garden, the Birmingham Botanical Garden, and the John D. Freeman Herbarium at Auburn University. An update on cogongrass mapping and the task force was given, in addition to a talk on its spread, control and eradication. Workshops covered invasive plant identification and alternative landscape plants, and tools, equipment and strategies for controlling invasive plants. The 1st Annual ALIPC Education and Outreach Grant was described, and additions to the ALIPC Invasive Plant List were discussed.

Florida Exotic Pest Plant Council 24th Annual Symposium — *The Weeds of Wrath* — Delray Beach, FL

FLEPPC hosted their 24th annual symposium May 26th-29th in Delray Beach, Florida. Attendance was recorded at 140, a lower figure than in years past, and all fingers point to the economic downturn as the culprit. Plans are to co-host future symposia with other groups sharing common goals in order to accomodate more attendees with less expense, and broaden the horizons of all. We'll keep you posted.

In all other ways, the symposium was informative and enjoyable. Dr. Joe DiTomaso of the University of California-Davis was the keynote speaker with *Biofuel Energy Plants: Are We Cultivating the Next Invader?* He explored the intersection of the biofuel industry and biological invasions. He argued the case for rigorous risk assessments of candidate biofuel species. A session followed with several presentations on invasive plants and biofuels in Florida. Other sessions included updates on mapping and data tracking

CORRIE PIETERSON

Dr. James Leary demonstrates Herbicide Ballistic Technology.

programs and invasive plant management programs, workshops on creating invasive plant management plans, herbicide resistance, and a natural areas weed management preparation class for a certification exam administered at the end of the symposium. Other sessions included Cooperative Invasive Species Management Areas (CISMAs), control strategies and biological control updates, biological invasion research, and the latest on herbicide evaluations. A couple of novel methods in invasive plant detection and control were described: Jon Lane (US Army Corps of Engineers, Jacksonville, FL) described monitoring invasives with unmanned aerial vehicles (think sophisticated model airplanes) and James Leary (University of Hawaii at Manoa) showed a video depicting the latest developments in Herbicide Ballistic Technology (HBT) (think paintball guns shooting herbicide pellets). For those of us too excited to remember his name, he was thereafter referred to as Paintball Guy. You can search YouTube for video clips on this thrilling new methodology.

Field trips included Loxahatchee National Wildlife Refuge and South Florida Water Management District herbicide demonstration plots, a working field trip using GPS, and tours of local nature parks and natural area restoration projects.

At the FLEPPC Board of Directors and general membership meetings, new board members were voted in and welcomed: Ben Gugliotti (Lake County Water Authority), Jackie Smith (Florida Fish & Wildlife Conservation Commission), Patricia Howell (Broward County Parks & Recreation), and Robert Farley, PBS&J Landscape Architect). Jim Burch (Big Cypress National Preserve) accepted the chair-elect position. Jim Burney (past chair) carries on as acting chair due to the departure of chairs Dan Clark and Scott Ditmarsen. Due to these unforeseen events, a bylaws change outlining a line of succession was developed and subsequently approved at the general membership meeting. Seven FLEPPC Education Grants and three Research Grants were awarded. Details will be posted on the FLEPPC website in the near future.

During our traditional rock-n-roll banquet, outgoing board members were presented with plaques and esteemed member and Plant Industry Liaison Doria Gordon (The Nature Conservancy) was named FLEPPC Advocate of the Year. Dr. Dan Ward (not present) was recognized with a Lifetime Achievement Award, being an active member of the important FLEPPC Plant List Committee since its inception in 1991 — a full nineteen years and counting! The FLEPPC List of Invasive Plant Species is used throughout the state as the *de facto* guide for research and management efforts. Attendees later danced to the awesome music presented by *The Weeds*.

Dr. Dan Ward

CEU credits toward licensing certifications can be earned at all of these meetings, adding another benefit to learning the latest and networking with peers in the exciting field of invasive plant management. We all hope to see you next year.

—Karen Brown, Editor

LeRoy Rodgers, Symposium Program Chair and outgoing board member. Dr. Doria Gordon awarded FLEPPC Advocate of the Year Award.

Internodes

Mark Your Calendar

- Mid-Atlantic Exotic Pest Plant Council in cooperation with the Morris Arboretum of the University of Pennsylvania, *Complicating Factors in Invasive Plant Management – Circumstances Beyond Our Control?* University of Pittsburgh-Johnstown Campus, PA. August 11-12, 2009. www.ma-eppc.org
- 10th International Conference on the Ecology and Management of Alien Plant Invasions (EMAPI), Stellenbosch, South Africa. 23-27 August, 2009. http://www.invasivespeciesinfo.gov/news/calendar.php
- 19th Conference of the Society for Ecological Restoration International, *"Making Change in a Changing World."* Perth, Australia. August 23-27, 2009. http://www.ser.org/
- 12th European Weed Research Society (EWRS) International Symposium on Aquatic Weeds. Jyväskylä, Finland. August 24-28, 2009. invasive-plants@ewrs.org or http://www.ewrs.org/ewrs-iw.htm
- 2009 ICOET International Conference on Ecology & Transportation, *Adapting to Change*, September 13-17, 2009, Duluth, MN. "The 2009 ICOET conference needs to hear more about the vegetation (native and/or invasives), pollinators, migratory birds, and climate change research that is being done on, OR applies to, highway corridors." www.icoet.net
- 36th Natural Areas Conference, *Living on the Edge: Why Natural Areas Matter*, Vancouver, WA. September 15-18, 2009. www.naturalarea.org
- 2009 North American Weed Management Association (NAWMA) Conference, *Response to the Riparian Invasion*. Kearney, NE. September 21-24, 2009. www.nawma.org
- International Congress on Biological Invasions, *Managing Biological Invasions Under Global Change*, Fuzhou, China. November 2-6, 2009. http://61.154.14.15/icbi2009/default.htm
- Southeast Herbicide Applicator Conference, Panama City Beach, FL. September 22-24, 2009. www.conference.ifas.ufl.edu/sehac

Publications

Influence of host-plant quality on the performance of Episimus unguiculus, *a candidate biological control agent of Brazilian peppertree in Florida*, by V. Manrique, J.P. Cuda, W.A. Overholt, and S.M.L. Ewe. BioControl (2009) 54:475-484.

Bringing Nature Home – How You Can Sustain Wildlife with Native Plants, by D.W. Tallamy. Timber Press. 2007. Written after the author purchased ten acres of land in southeastern Pennsylvania that had been invaded by alien plants such as multiflora rose, Oriental bittersweet and Japanese honeysuckle.

Candidates for biocontrol of Macfadyena unguis-cati *in South Africa: biology, host ranges and potential impact of* Carvalhotingis visenda *and* Carvalhotingis hollandi *under quarantine conditions,* by H.E. Williams, S. Neser, and L.G. Madire. BioControl (2008) 53:945-956.

Native North American Azolla *weevil,* Stenopelmus rufinasus *(Coleoptera: Curculionidae), uses the invasive Old World* Azolla pinnata *as a host plant*, by R.W. Pemberton, J.M. Bodle. Florida Entomologist 92(2009): 153-155. "The native weevil, *Stenopelmus rufinasus*, a specialist herbivore on North American mosquito ferns (*Azolla* spp.), has adopted *Azolla pinnata*, an incipient invasive weed in Florida from the Old World. This situation...is unique."

Effects of hydrology on the growth and physiology of an invasive exotic, Lygodium microphyllum *(Old World climbing fern),* by S. Gandiaga, J.C. Volin, E.L. Kruger and K. Kitajima. Weed Research (2009) 49:283-290.

Current practices and future opportunities for policy on climate change and invasive species, by C.R. Pyke, R. Thomas, R.D. Porter, J.J. Hellmann, et al. Conservation Biology (2008) 22:585-592. "Federal research priorities suggest that the implications of using invasive species for biofuel production are receiving limited attention in comparison with large-scale research and development focused on engineering and agricultural technology."

The rationale for monitoring invasive plant populations as a crucial step for management, by B.D. Maxwell, E. Lehnhoff and L.J. Rew. Invasive Plant Science & Management (2009) 2:1-9. "The model simulations suggest that managers could dedicate 50% of their management time to monitoring without risk of accelerating invasions or reducing the impact of their weed management program."

Palynological investigation of post-flight solid rocket booster foreign material by D.M. Jarzen and L.A. Nelson. The Microscope (2008) 56:157-162. "Investigations of foreign material in a drain tube from the Solid Rocket Booster (SRB) of a recent Space Shuttle mission was identified as pollen" from a Florida Category I invasive pest plant, Brazilian pepper *(Schinus terebinthifolius).*

Marketing time predicts naturalization of horticultural plants by R.W. Pemberton and H. Liu. Ecology (2009) 90:69-80. "We analyzed a unique set of data derived from the detailed sales catalogs (1887-1930) of the most important early Florida, USA, plant nursery (Royal Palm Nursery) to detect naturalization patters of these horticultural plants in the state.

Prohibited plants – beware of the company you keep, by L. Rodgers. Ornamental Outlook (2009) http://www.ornamentaloutlook.com/magazine/?storyid=725

Landscaper's darling hybridizes into an environmental nuisance – variation underlies the Callery pear tree's transformation, by S. Milius. Science News (May 9, 2009) www.sciencenews.org "The new pear study 'does illustrate really nicely this issue of cultivated varieties and why we should be careful' says conservation biologist Sarah Reichard of the University of Washington in Seattle."

Old World climbing fern (Lygodium microphyllum) *– Find it...report it...kill it,* by R. Rowe. Florida Exotic Pest Plant Council (2009) http://www.fleppc.org/publications.htm

Tropical soda apple biological control with Gratiana boliviana, by K. Gioeli. University of Florida-IFAS Extension (2009), http://plants.ifas.ufl.edu/misc/pdfs/TSA_Bio_Control_brochure_rev4.pdf

The March 2009 issue of *Forest Wisdom*, a publication by the Forest Guild, focuses on invasive insects and plants of forests. Available at: http://www.forestguild.org/Publications.html

Kudos

Newt Hardie of the Kudzu Coalition (http://www.kokudzu.com/) has been named 2009 recipient of the prestigious *Spirit of Service* award. This recognition is given to one senior volunteer annually by the Corporation for National and Community Service (parent organization for AmeriCorps and Senior Corps) in conjunction with the Points of Light Foundation. "Who in the world can get people excited about Kudzu?" asks Kathy Dunleavy, President and CEO of United Way of the Piedmont. "One man – Newt Hardie! Newt recruited hundreds of teenagers, senior citizens, individuals with disabilities – all walks of life – and put them to work in the Kudzu patch. He mobilized an entire community around a central concern and look at the result! Newt Hardie has definitely made his mark." – Congratulations, Newt! On behalf of the SE-EPPC, thank you for your dedication and hard work on controlling exotic pest plant species!

Michael Lusk, USFWS National Invasive Species Coordinator, presented the Center for Invasive Plant Management with the Invasive Weeds Awareness Coalition's 2009 special achievement award "*for outstanding work in promoting education and research in invasive plant management and National Invasive Weed Awareness Week support*." Visit CIPM's outstanding website at http://www.weedcenter.org/

New Developments

Add your CWMA to the National Map! – A national map of Cooperative Weed Management Areas is being compiled by the National Network of Invasive Plant Centers (NNIPC) [see next item]. Programmed and hosted by the Center for Invasive Species and Ecosystem Health/Bugwood, the interactive Google map illustrates the broad range of community-led weed management efforts in the United States. (Be sure to click-and-drag to Alaska and the Canadian provinces, too.) All CWMAs are invited to input their data and become a pop-up point on the map - just go to http://www.invasiveplantcenters.org/cwmamap.cfm. All that's required is simple location and contact information. The map will continually evolve as people add their CWMA info.

The National Network of Invasive Plant Centers (NNIPC) intends to aggregate and synthesize a variety of regional information to provide a national perspective for natural resource managers, policy-makers, educators, researchers, and conservationists. It will focus on four areas that warrant national discussion and coordination: early detection and rapid response, cooperative weed management areas, economic impacts of invasive plants, and invasive plant education. For more information about the network, visit the NNIPC website at www.invasiveplantcenters.org.

Southeastern Community College in North Carolina is offering an online Invasive Species Management program to provide individuals with training and field experience in controlling invasive species, with a focus on invasive plants. Students may choose to complete classes for continuing education requirements, a certificate in Invasive Species Management, or an associate in science degree in Environmental Science Technology with a second-year focus in Invasive Species Management. For more information, call SCC at 910-642-7141, ext. 279 or visit www.sccnc.edu.

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