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On the Cover:

The Last Melaleuca.
See article on page 4.
Photo by Tony Pernas.



Tide Turns in War on Melaleuca

Ceremony celebrates completion of the initial treatment of melaleuca in Big Cypress National Preserve

National Park Service Director Fran P. Mainella waits, herbicide in hand, as forestry technician Bill Snyder performs the symbolic cutting of the last mature melaleuca tree in the 729,000 acre Big Cypress National Preserve in south Florida. "The National Park Service has been treating melaleuca in Big Cypress National Preserve since 1984 and has dealt with about 14 million stems at last count," said Mainella. "We know this war will go on but we are marking a major victory in the initial effort to eradicate this difficult exotic species."

The Park Service has used Integrated Pest Management in its treatment of melaleuca, including biological, chemical, controlled fire and mechanical methods. Big Cypress Superintendent John J. Donahue says the national preserve has spent approximately \$3.5 million on contracts and in-house crews since 1984 to bring the species under control. The cutting of the last mature melaleuca means "we are not treating new infestations in the preserve, but rather revisiting treated sites to ensure no seedlings are re-establishing new stands," he said. "There still is a need for continued funding for re-treatment of melaleuca to ensure it stays under control. However, this success proves that it can be contained and eliminated."

-Compiled from a National Park Service news release



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Ranking System Aids Land Managers in Control of Invasive Species

by Sara J. Drake

Approximately 5000 non-native invasive plant species inhabit the U.S. and they make their presence felt—\$35 billion annually for losses, damages, and control measures (Pimentel et al. 1999). Since the impact of invasive species on our ecosystems and economy is immense, most land managers recognize the need for action. With limited funds, time, and personnel, though, they must prioritize their efforts. But where to begin such an arduous task?

The “Alien Plants Ranking System” developed by the United States Geological Survey provides a starting point (APRS Implementation Team 2000) for determining which species are most problematic. The system uses a query method to amass information about species characteristics as well as features of the invaded community. Twenty-three multiple-choice questions are assembled into three sections: I) Significance of Threat or Impact, II) Innate Ability to Become a Pest, and III) Difficulty of Control. Examples of some queries are, “areal extent of populations,” “mode of reproduction,” and “competitive ability.” These queries zero in on attributes commonly associated with invasive species and susceptible ecosystems.

Ranking System Implementation

In collaboration with Jake Weltzin, plant ecologist at the University of Tennessee, Knoxville, and Oak Ridge National Laboratory Area Manager, Pat Parr, I tested the usefulness of the system. The Department of Energy’s National Environmental Research Park (Research

Park) in Oak Ridge, Tennessee contains 167 non-native invasive plant species, 42 of which are classified as “aggressive” (Oak Ridge Reservation Exotic Pest Plants 2001). I selected 18 of the most prevalent species and ranked them using the “Alien Plants Ranking System.” During the summer of 2000, I surveyed 16 natural areas encompassing a total of 1,457 hectares and visually noted the density and distribution of the 18 species. These observations were supplemented with published data from the ecological literature and entered into the ranking system.

Japanese stiltgrass (*Microstegium vimineum*) ranked highest, or most problematic, mainly because of its impact on ecosystems and how difficult it is to control. *Microstegium* is present in most disturbed areas of the Research Park as well as in many natural areas. It can be found growing along roadsides and often penetrates forested areas, resulting in a dense, monotypic carpet. This weed is difficult to control because it has an extensive seed bank and spreads rapidly, out-competing native species.

Japanese honeysuckle (*Lonicera japonica*) ranked second-most problematic and was prevalent in early- to mid-successional forests in the Research Park. Also prevalent in these forests was Chinese privet (*Ligustrum sinense*), which tied with kudzu (*Pueraria lobata*) for third place. Chinese privet often forms thick, impenetrable stands with relatively shady understories. Birds disperse Chinese privet’s copious fruits, while asexual reproduction also helps it

spread. Kudzu reproduces both sexually and asexually, but unlike privet, it was found in only a few locations on the Research Park. The low density of kudzu across the Research Park may be due to its purported small number of viable seeds.

Ranking fifth was multiflora rose (*Rosa multiflora*), a shrubby weed found mostly along roadsides and fencerows. Multiflora rose also is spread by birds and has an extensive seed bank that can persist for 20 years. Chinese lespedeza (*Lespedeza cuneata*) came in sixth and occurred only in more recently disturbed areas, such as along roads and in power line rights-of-way. Additional Research Park ranking results can be found in Drake, Weltzin, and Parr (2003).

The “Alien Plants Ranking System” produced satisfactory results consistent with species ranking designations from other organizations, such as the Tennessee Exotic Pest Plant Council (2001). Results of this research can be used to prioritize management efforts for eradication of invasive species on the Research Park. Additionally, this work provides impetus for other land managers to utilize the “Alien Plants Ranking System” as a tool when controlling invasive species.

For more information or to use the Alien Plants Ranking System, go to www.npwrc.usgs.gov/resource/2000/aprs/aprs.htm

For more information, contact Sara J. Drake at the Department of Plant Biology, The University of Georgia, Athens, Georgia 30602-7271; sdrake@plantbio.uga.edu

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Exotic Plant Management through the Seasons at Great Smoky Mountains National Park

by Kristine Johnson

Introduction

The official mandate of the National Park Service (NPS) is “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” When this guideline was set forth in the 1916 Organic Act that established the National Park Service, no one’s worst nightmares could have foretold the threats our national parks face in 2003: poor air quality, urban sprawl at the boundaries, and a tremendous influx of exotic species. Still, the earliest NPS policies provide protection for the biological diversity of native species (from genetic through community levels) and for the prevention and control of exotic species, which constitute a primary threat. Additional guidelines were established in 1999, when President Clinton issued Executive Order 13112 directing all federal agencies to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them.

At Great Smoky Mountains National Park, some of the earliest exotic invaders included chestnut blight, European wild boar and rainbow trout (introduced in the first part of the past century), balsam woolly adelgid, dogwood anthracnose, beech bark disease, hemlock woolly adelgid, and butternut canker. There are also around 380 species of exotic plants that remain from old homesites or have invaded disturbed areas such as roadsides, wildland fires, or construction sites. The National Park Service manages only about 50 exotic plant species: those known to be invasive enough to displace native plant communities, hybridize with natives, or interfere with cultural landscapes.

The history of exotic plant management at the Smokies goes back to the 1940’s, when fire control aides spent some of their off-season time on eradication of kudzu at old homesites. This early work provided a good foundation for the expanded resource management program that began in the 1980’s to implement an integrated pest management program. A team of botanists from the University of Tennessee (Drs. Ed Clebsch, Richard Clements, and Gene Wofford) conducted a baseline inventory of invasive exotic plants. Strategies then were developed to control each plant based on the species biology.

Control methods include hand pulling, mechanical cutting, and selective use of herbicides. The latter are carefully chosen for minimal environmental impact and used as sparingly as possible. Currently nearly 800 exotic plant sites are documented in the

Park’s database. All treatments and monitoring activities are recorded, and the database is referenced to an Arcview Geographic Information System.

To every thing there is a season...

Timing is crucial in an effective Integrated Pest Management program. For example, seed dispersal must be prevented in many species; action must be taken against garlic mustard by the end of April, while privet and multiflora rose don’t have mature fruit until late summer. Impact on non-target plants can be greatly reduced if treatments can be made during the dormant season. And since Japanese barberry produces leaves much earlier in spring than most natives, the seedlings are easy to spot and pull in early April.

Each of the following plants is well documented as invasive in the Mid-Atlantic States and all are expanding their range in the Southern Appalachians.

Early Spring

Garlic mustard (*Alliaria petiolata*) is a biennial herb in the mustard family. First recorded in the U.S. around 1868 from Long Island, New York, it was introduced by European settlers as a medicinal herb. Its leaves have a garlic-like odor when crushed, and its white flowers develop into prolific tiny seeds



Garlic mustard
(*Alliaria petiolata*)

with very high germination rates and viability in soil for up to ten years. The Park has five established garlic mustard sites. Several other sites were discovered near trailheads (perhaps seeds came off hikers’ boots or vehicles) and the plants were removed before seeds were produced. Of the established sites, four probably started during construction projects when seeds were brought into the Park with straw, contaminated seed mix, or soil. In recent years, the Park has adopted more stringent standards for imported construction materials, since prevention is preferable to subsequent years of control efforts. The fifth site is a riparian area where seeds apparently washed in from a tributary outside the Park or from a nearby road. Since garlic mustard is not perennial, its root systems usually are not extensive or deep, and the goal is to prevent seed set. Plants can be hand-pulled any time prior to bloom, which is usually April in East Tennessee. An established site (where seed production has occurred for a year or more) must be monitored for at least ten years to insure that no plants germinate. Over the past eight years, Park workers have removed 78,652 garlic mustard plants from Big Creek Campground, 23,617 from Balsam Mountain Campground, 21,850 from Cosby Campground, 15,663 from the Maloney Point Overlook, and 10,610 from Caney Creek near the boundary at Pigeon Forge. These figures indicate the exponential potential expansion of garlic mustard, which easily out-competes native spring flora.

Because all but the Maloney Point site are in areas with rich native flora, we have chosen the very labor-intensive hand-pulling method over herbicide.

Coltsfoot (*Tussilago farfara*) also is found in disturbed areas. One site within the Park is a roadside at high elevation and the second is a wildland fire area several miles from the Park boundary. Seeds may have been introduced to the fire site on firefighters' clothing or tools, or may have blown in from a distance. Over 520 plants were pulled in the past two years from the Wedge Ridge fire site, which burned in 2000. Coltsfoot is a perennial in the Aster family and somewhat resembles a dandelion, with a yellow flower and light, wind-blown seeds. Like garlic mustard, it was brought to America by European settlers as a medicinal herb. Coltsfoot can be hand-pulled to prevent seed set, but it also spreads vegetatively and has an extensive root system. Park workers made an alarming discovery last year when root segments an inch or more in size were potted up and within a few weeks had grown into entire new plants!

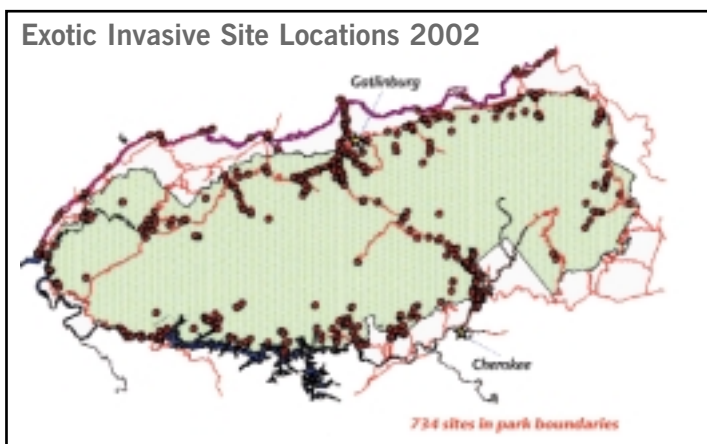
Japanese barberry (*Berberis thunbergii*) was introduced as an ornamental shrub in 1875 and is still widely used as a landscape plant. It spreads vegetatively but also produces prolific seeds that can be distributed for miles by birds and small mammals. It is shade tolerant and can form dense stands in a variety of habitats, from closed canopy forests to pastures. There are two barberry sites in the Park, and in both cases a few original shrubs have produced thousands of seedlings spread over several acres. At the Twin Creeks site, 1,048 seedlings were pulled in the past 8 years, originating from only one 'mother' shrub. At Elkmont, 2,839 seedlings have been pulled over the past 8 years, again originating from two large shrubs. The seedlings can be hand-pulled, and April is a good time to spot them because barberry produces new leaves earlier than most native deciduous plants. Larger shrubs are cut and stump-treated with glyphosate.

Late spring

Multiflora rose (*Rosa multiflora*) has leafed out by late April and early May, somewhat ahead of most native shrubs and thus easily visible. Small clumps of rose are easily treated by basal bark applications of triclopyr/oil in other seasons, but dense thickets of rose have been successfully treated with foliar applications of glyphosate. The Little Cataloochee section of the Park is a remote area where old homesites have been overgrown by multiflora rose that was planted in the 1930's as an erosion control (just prior to the Park's establishment). We estimate that by the late 1980's, when control was begun, over 12 contiguous acres of rose grew in thickets of various sizes throughout the Little Cataloochee area. Herbicide applications in this area are difficult due to the remote location (work crews must camp out) and the distance from water. In order to mix herbicide, water must be pumped up to holding tanks using equipment from wildland firefighting operations including portable pumps, fire hose and folding tanks. Now that native plants occupy many of the former rose sites, treatments are still performed in spring to reduce non-target impacts and for easier access.



Crew after a hard day of killing paulownia on the Blacksmith 500 acre fire site.



Summer

June and July are the best times to survey for paulownia or princess tree (*Paulownia tomentosa*), mimosa (*Albizia julibrissin*) and ailanthus or tree of heaven (*Ailanthus altissima*), since these invasive trees bloom during that time. Seedlings are hand-pulled, but larger stems must be cut and stump treated. One of our most difficult sites overall has been a 500 acre wildfire site that burned in the summer of 1999 and was subsequently invaded by paulownia, ailanthus and woolly or common mullein (*Verbascum thapsus*). Seeds of these plants blew in from large infestations just outside the Park boundary and quickly became established on the mineral soil left by the fire. Thousands of seedlings have been removed; some areas averaged 40 paulownia seedlings per acre. With no canopy left in many parts of the burned area, paulownia was in good position to become a dominant species. In November 2001 one of the largest fires in Park history burned 7000 acres on the North Carolina side of the Park. Unfortunately the southern boundary of the fire, just outside the Park, was an old municipal watershed area badly infested with paulownia and ailanthus. The Park received funds through fire rehabilitation to begin surveying and controlling exotics on this fire site.



Mimosa (*Albizia julibrissin*)

Chinese yam (*Dioscorea oppositifolia*) is treated prior to its summer production of bulbils. Glyphosate and triclopyr are both effective on yam.



Wisteria
(*Wisteria floribunda*)

By August, it's time to treat the few remaining kudzu (*Pueraria lobata*) and wisteria (*Wisteria floribunda*) sites left at old homesites. The Park has documented 130 kudzu sites but, thanks to the hard work of those before us, only a few are still active. In recent years we have used the herbicides Transline in areas away from water and Accord near streams for control of both

kudzu and wisteria. Some of the sites are very remote now and require hiking several miles with equipment.

Our field trials for control of sericia lespedeza (*Lespedeza cuneata*) indicate best results from late summer treatments, which conveniently coincide with approaching fall frosts so that large brownout areas are not noticeable in treated fields. Our largest areas of lespedeza are in Cades Cove, where lespedeza and fescue were planted in the 1950s-1970s. Garlon 4 and Escort are the most effective herbicides for lespedeza.

Fall/Winter

Dormant season treatments can begin once frost has ended the growing season for all but the evergreens. Privet (*Ligustrum* sp.), Japanese honeysuckle (*Lonicera japonica*), vinca (*Vinca minor*), winter creeper (*Euonymus fortunei*) and English ivy (*Hedera helix*) can all be treated with minimal non-target impact. Foliar applications are possible on days when temperatures rise above 60°F. Garlon 4 and Accord are both effective on these plants, although Garlon appears to work more quickly. Basal bark and cut/stump methods also are used on privet, depending on the site.

Our biggest challenges are finding enough personnel (paid and volunteer) for the labor-intensive work, and preventing new invasions from sites outside Park boundaries. Recently we have made good progress in cooperating with Park maintenance and contractors to prevent introductions from using fill dirt, hydroseeding, and other construction activities. Straw is no longer used for mulch/erosion control because of the barnyard weeds that came with even 'clean' straw, and if fill dirt must be brought from outside the Park, the site of origin is inspected first for weeds. The Park has been able to persuade some neighboring landholders to control their own exotics (especially those that produce seeds carried by birds or wind), but many are unable or unwilling to cooperate. We hope that through the Exotic Pest Plant Councils and other educational programs, the general public will become more aware of the threats exotic plants pose to our natural areas, so that we may "leave them unimpaired for the enjoyment of future generations."

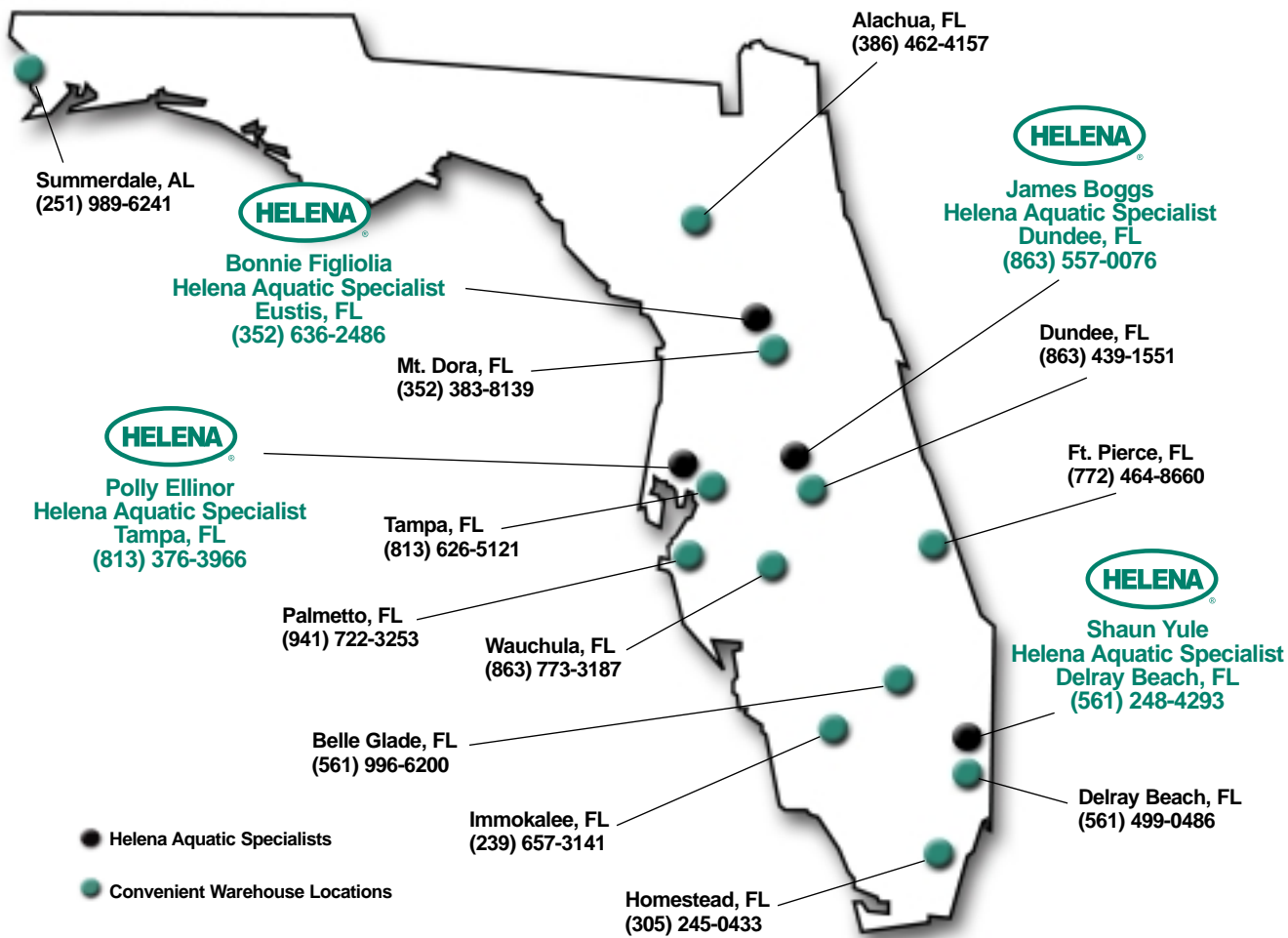
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More information can be found at:

- *Tennessee Exotic Pest Plant Council, www.tn-eppc.org*
- *Southeast Exotic Pest Plant Council, www.se-eppc.org*
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Park visitors who find any of these plants in the Park can notify the vegetation management section at 865-436-1707.

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Detecting Invasive Exotic Plants

by Bob Doren

Approaches for the Florida Landscape, February 12-14, 2003

The South Florida Ecosystem Restoration Task Force and Working Group's invasive species arm, the Noxious Exotic Weed Task Team (NEWTT), held a workshop and conference to answer basic questions about the detection and mapping of invasive exotic plants.

The first day covered technical aspects of the different methods of remote sensing, imaging technologies, scaling, computer storage and retrieval considerations, and equipment. The second day covered existing applications of field and remote sensing and modeling applications to assist managers in finding and managing invasive plant populations. The third day was a series of workshop discussions based on topics from the previous two days, and pre-defined conference questions and goals. The discussions related to practical applications, enhancing existing programs, and helping agencies integrate these concepts into their work.

Three overarching issues became apparent:

1. Remote sensing using imaging systems (photographs, thematic imagers, etc.) is generally not applicable or practical in instances where both very detailed and high-resolution results are required, or where extremely large areas are being covered. In the case of extremely large areas of coverage, modeling seems to be developing as a practical alternative tool for locating the most probable locations of exotics.
2. Simple, low-tech and low-cost tools are essential to field man-

agers who are on the ground trying to find and control invasive species. In most instances, managers are not remote sensing specialists and have extremely limited budgets. The most important aspect for them is to find the plants and control them.

3. Existing low-tech field remote sensing methods are practical, cost-effective, and achieve basic agency aims; however there is general agreement that these methods are not sufficient to meet other critical information needs such as repeatability, re-treatment information, ecological and landscape use relationships, and areal extent and invasion rate calculations. In particular, more precision is needed in spatial coordinates for species locations. The expert panel members felt this was the most important improvement that could be made and was critical to future GIS spatial analyses and prediction.

These points will provide direction and guidance during preparation of a comprehensive report of the conference results. The report is intended to be a "user's manual" for developing and implementing a cross-agency program for detection, mapping and assessment of invasive exotic plants. The report will include a sufficient number of different approaches and mapping scales to provide most users with reliable, repeatable and interoperable methods for the majority of different needs.

For more information, contact Robert Doren, South Florida Ecosystem Restoration Task Force, doren@fiu.edu

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The Asheville Bittersweet Sweep

by Dick Bir

The Blue Ridge Parkway is one of our national treasures. This naturally landscaped roadway allows millions of people to view the splendor of the southern mountains in comfort and supplies access to superb highlands hiking. The forested corridor provides interstate respite for drivers passing through Asheville, as well as habitat for wildlife, and it both shelters and affords access to the Mountain-to-Sea hiking trail. This sanctuary is a green bridge between larger parts of the surrounding mountain national forests as well.

Recently this beautiful Parkway corridor has come under attack. Pine bark beetles, gypsy moths, adelgids and invasive plants are among the exotic invasive threats to this jewel in the Department of Interior's crown. During fall, when visitors arrive in droves to admire the vibrant colors, nothing is more noticeable among the attackers than Oriental bittersweet, *Celastrus orbiculatus*. This prolific woody vine can be seen draping trees and strangling and smothering shrubs, threatening the very existence of native azaleas, mountain laurels and wildflowers. Oriental bittersweet's golden fruit husks open to display the deep red-orange fruits, as the foliage turns a clear, bright yellow. Multitudes of seedlings grow under trees tightly wrapped in bittersweet. As a result, for a few weeks it is easy to spot Oriental bittersweet, although removing it and liberating the native flora is more of a problem.

Unfortunately, these threats have arrived in an era when resources within the Department of Interior are stretched thin. Fortunately, however, Jane Hargreaves, who lives near the Parkway and regularly hikes the Mountain-to-Sea trail, noticed the increase in bittersweet and the negative effect it was having on her beloved native mountain flora. She formed a group of concerned citizens, the Asheville Weed Team, to do something about the problem. Under the direction of Dr. Chris Ulrey, botanist for the Blue Ridge Parkway, they mapped a strategy to dramatically decrease the Oriental bittersweet population along the Asheville corridor of the Blue Ridge Parkway.

This relatively small but dedicated group of volunteers met at Parkway headquarters on the foggy, drizzly Saturday morning of October 26, 2002. They were trained in plant identification, which was easy since there was only one target



Jill M. Swearingen, U.S. National Park Service

plant. Each volunteer was issued a bright orange vest provided by the North Carolina Arboretum, instructed in safety including how far to stay off the paved road, separated into work groups and then assigned an area to weed. There was a licensed pesticide applicator in each group who was the only one allowed to apply the triclopyr used on cut stems when bittersweet vines were too large to be hand pulled (some were 4 or more inches in diameter).

It was wet, dirty work but also very satisfying. College professors and students worked side by side with botanists, bakers, nurserywomen, environmentalists, retirees and landscapers. All we had in common was a love for the parkway and the native flora that was being smothered by the invasive exotic Oriental bittersweet. We worked most of the day...to sweaty exhaustion for most of us.

We know that we have made a dramatic impact but also know that there is a tremendous seed bank and that we did not get every Oriental bittersweet seedling. We have no illusions that what we have done is a permanent change, but what we have done is give the existing native azaleas, mountain laurels, spice bushes, sweetshrubs and spring ephemerals a chance. We hope to return to give them an even better chance in the future. The group has planned a similar weed pull at the Western North Carolina Nature Center in late winter and they are meeting regularly to discuss how to accomplish their common goal of freeing their home city of invasive exotic plants.

An interesting spin-off of this unpublicized activity is that in the process of organizing the bittersweet sweep, Jane talked with Julie Ball, a reporter for the Asheville Citizen-Times newspaper. Ms. Ball wrote a feature article on Oriental bittersweet and the problems it presents. The Associated Press picked up the article and within a few days the bittersweet story had made its way to Winston-Salem and Raleigh newspapers. Reports have come that her bittersweet feature appeared in newspapers from the Wall Street Journal to South Georgia. When you start controlling invasives, you never know where the trail will lead.

For more information on this species, go to: www.nps.gov/plants/alien/fact/ceor1.htm or www.tncweeds.ucdavis.edu/esadocs/celaorbi.html

For more information, contact Dick Bir, NC-EPPC, at dick_bir@ncsu.edu



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National Invasive Weeds Awareness Week IV

organized by the Invasive Weed Awareness Coalition (IWAC) in Washington DC by Nelroy Jackson

More than one hundred people, representing twenty-eight states, registered and participated in several interactive sessions of NIWAW IV during the week of February 24-28, 2003 in Washington, DC. Representation covered Southeastern states, Midwestern states and most of the states west of the Mississippi River, as well as the Washington DC area, and included local, state, and federal government, academic, NGO's, industry personnel, private and public landowners and land managers.

The opening session offered a breadth of topics ranging from weed-free hay standards, electronic mapping techniques, status of some specific projects, Capitol Hill etiquette, and an update on the National Invasive Species Council (NISC) and the Invasive Species Advisory Committee (ISAC) highlighting progress on the crosscut budget (an analysis of the portion of federal agency budgets devoted to invasive species issues). Nineteen exhibits from a variety of agencies and organizations were displayed during the week at the U.S. Botanic Gardens. Many high-level managers from NISC departments and agencies attended the excellent reception at the Smithsonian Castle.

Something new this year was the presentation of awards to significant contributors who have increased the awareness of invasive plants. The award recipients were: Al Cofrancesco (individual); Fort Hunter Liggett, CA (for on-the-ground effort in controlling yellow starthistle); the National Wildlife Refuge Association (for public outreach and education); and the North Carolina Botanical Gardens. In addition, Randy Westbrooks received a joint IWAC - FICMNEW award for outstanding personal achievement.

The Briefing sessions at USDA featured two Undersecretaries, two deputy undersecretaries, and the administrators of CSREES, ARS, APHIS, and NRCS. The Briefing ses-

sion at the Department of Interior featured one Assistant Secretary and the administrators of FWS, BLM, BOR, NPS, USGS, and BIA. The Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) meeting was highlighted by discussions of the proposed early detection and rapid response (EDRR) network, invasive plant management positions, and an update on Japanese stiltgrass. Feedback from the administrators indicated they were impressed by the large turnout during the meetings, showing the interest of stakeholders in the invasive weed issue.

Perhaps most importantly, participants from the several states had numerous visits with their senators and members of the House of Representatives. The majority of the Hill visits were to key members of both political parties on agriculture, resources, and environment committees.

The success of NIWAW was due to the planning by the Weed Science Society of America, Dow Chemical Company, Monsanto Company, BASF Corporation, and all the federal agency partners mentioned above. The large attendance was due to strong support from the Intermountain Noxious Weed Advisory Council (INWAC), Western Weed Coordinating Committee (WWCC), North American Weed Management Association (NAWMA) and the South Florida Water Management District. Representatives had more than 17 meetings with various NGO's and agencies to present and discuss their positions on several critical issues and concerns.

NIWAW-IV was highly successful and most comments by the participants were positive and favorable, with constructive critiques to improve future NIWAW events.

For more information contact Nelroy Jackson via e-mail at nelroy.e.jackson@monsanto.com

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CONTROL OF REGROWTH FROM AIR POTATO (*Dioscorea bulbifera* L.) BULBILS

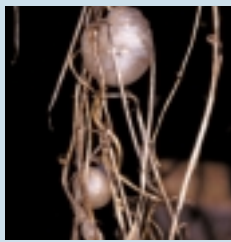
by Craig Duxbury¹, Scott Glasscock², Iwona Staniszewska³

Introduction

Air potato (*Dioscorea bulbifera* L.) is an herbaceous vine native to Asia. It was first introduced into Florida in 1905 and can now be found throughout much of the state (Langeland and Burks 1998). *D. bulbifera* is listed as a Category I plant by the Florida Exotic Pest Plant Council (www.FLEPPC.org/01list.htm) meaning that this plant is capable of altering native plant communities by displacing native species. In 1999, air potato was added to the Florida Noxious Weed List (FDACS, F.A.C. Chapter 5B-57).

D. bulbifera produces aerial tubers or bulbils which drop to the ground to produce new plants. These structures enable the plant to spread rapidly and engulf native vegetation (Langeland and Burks 1998). Management of this vine is challenging, largely because of the plant's ability to grow from bulbils. Repeated herbicide application and mechanical methods (i.e., hand-pulling) are the most common control methods (Gordon et al. 1996).

The purpose of this research was to evaluate the effectiveness of two herbicides on pruned air potato vines. A potential large-scale management technique would be to cut and remove vines, and then treat the remaining stems with herbicides. Removing vines is labor-intensive, and would ideally occur before bulbil formation. However, if air potato vines were removed after bulbil formation,



leaving bulbils on the ground, herbicide treatment could reduce the number of plants the following season.

Our goals were to determine the most effective herbicide and method of application to control regrowth from bulbils.

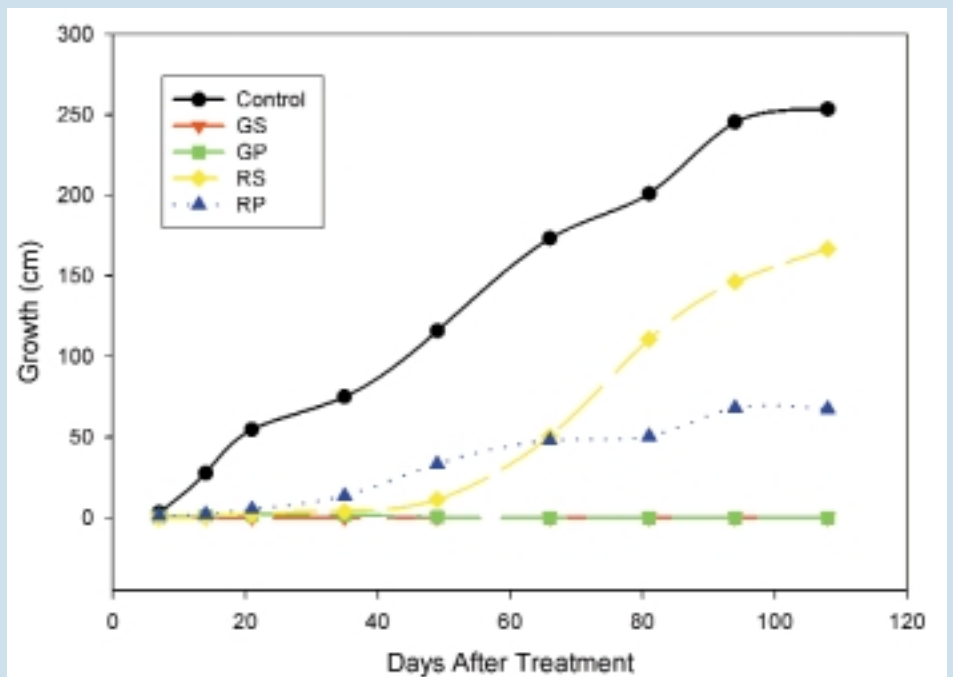


Figure 1. Cumulative growth of air potato (*Dioscorea bulbifera* L.) vines following cutting and herbicide treatment. Herbicide treatments consisted of: GS = Garlon Spray, GP = Garlon Paint, RS = Roundup Spray, and RP = Roundup paint. There was no growth for GS and GP treatments.

Methods

This study was performed in Lake Buena Vista, Orange County, Florida. On 26 March 2001, we planted forty *D. bulbifera* bulbils in 3.8 L pots containing #121 potting soil. Plants were grown outside, under ambient conditions, and watered daily. On 15 June 2001, after 81 days of growth, the plants had grown an average of 200 cm. We then pruned them to 5 cm, with no leaves. The remaining stems were randomly assigned to one of four treatments, each containing 10 replicates. The four treatments consisted of: a control, Garlon3A[®] spray (GS), Garlon3A[®] paint (GP), Roundup[®] spray (RS), and Roundup[®] paint (RP). Herbicides were applied at typical label rates: Garlon 3A[®] (44.4% A.I.) is a triclopyr herbicide and was applied at 6 oz/gal (4.7% solution). Roundup[®] (41% A.I.) is a glyphosate herbicide and was

applied at a concentration of 3 oz/gal (2.3% solution). The plants were treated with herbicides immediately after cutting. The spray treatments were applied with a backpack sprayer to wet the stems, and attempts were made to minimize runoff. Because the pruned stems did not have any leaves, we also applied each herbicide with a hand brush to insure that coverage was complete. While this is not a practical method to apply herbicides on a large-scale, we felt this would insure that the herbicide was applied evenly over the pruned stems. After cutting and herbicide treatment, the plants were watered on a daily basis. We measured the length of new growth from the bulbils (including regrowth from the pruned stem, as well as new stems from each bulbil) at 7, 14, 21, 35, 49, 66, 81, 94, and 108 days after treatment (DAT).

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Results

We found that growth rates from untreated cut stems were similar to the pre-cut growth rates. For example, before pruning, the plants grew an average of 2.5cm/d. After pruning, the control plants grew an average of 2.3 cm/d. In contrast, the growth rates of bulbils treated with herbicides were suppressed (Fig. 1). However, the herbicides appeared to differ in their effectiveness. We found that Garlon® was more effective than Roundup®, achieving 100% control with both spray and paint application methods. We measured a 100% and 73% reduction in growth rates for Garlon® Paint and Roundup® Paint, respectively, compared to control plants. We also found that Roundup® Spray treatment was less effective than Roundup® Paint treatment; causing a 34% reduction in growth rate, compared to a 73% growth rate reduction.

Discussion and Conclusions

We found that regrowth from pruned air potato bulbils is rapid, averaging 2.3 cm/d. We also found that herbicides were effective in controlling regrowth. However, there were differences in the efficacy of the two herbicides tested, as well as in the method of application. Garlon® was more effective than Roundup®, completely inhibiting regrowth from pruned bulbils in both the spray and paint treatments. Spray and paint application of Roundup® reduced plant growth by 34% and 73%, as compared to controls, respectively. Thus, it also appears that painting of the herbicide resulted in better coverage, and subsequent control of plant growth.

These results are similar to previous research conducted on air potato. For example, Mullahey and Brown (1996) compared the efficacy of six herbicides applied to vines approximately 10 m in height. They found that Roundup®, Remedy®, and Garlon® provided higher growth suppression at 91 DAT than Finale®, Weedmaster®, and Banvel®. Another group of investigators (Gordon et al. 1996) compared a one-time treatment of hand pulling of air potatoes with Roundup® and hand pulling. They then assessed growth and survival for three

years. Although this effort was confounded by disturbance from a hurricane, the results suggested that hand pulling was effective without herbicide treatment. However, the results were inconclusive as to whether repeated herbicide application would have controlled regrowth from tubers.

Thus, our data suggest that the growth of air potato can be controlled by mechanical cutting, followed by application of Garlon® to the cut stems. Removing cut stems could potentially reduce the amount of climbing structure available for new growth and, if removed during or after aerial tuber formation, the number of these structures that potentially could grow in the following season.

Further study at a larger temporal and spatial scale is warranted to determine the most efficient method for controlling the long-term growth of air potato.

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Great Air Potato Roundup

The City of Gainesville Nature Operations Division held the fourth annual Great Air Potato Roundup in February. Almost 900 volunteers collected over 12 tons of tubers from the air potato vine in Gainesville public areas. Students from Brentwood School joined in the effort to reduce the invasive vine in their schoolyard. – K. Brown





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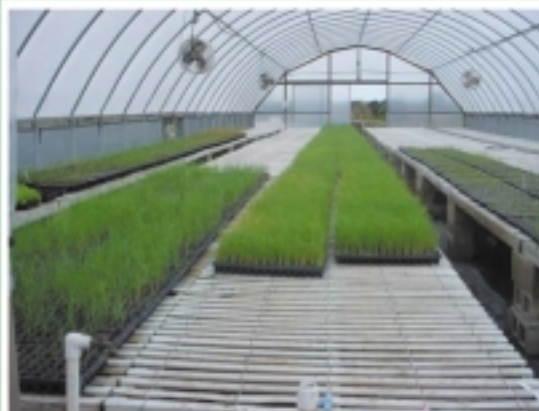
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FLEPPC Springs up at the TBWG's Spring Expo Trade Show

by Andrea Van Loan

The Florida Exotic Pest Plant Council made a return visit to the Tampa Bay Wholesale Growers' Spring Expo this year with an educational display. The Expo, called *The Spring Horticulture Trade Show of the Southeast*, was held on Friday and Saturday, February 21 and 22 at the Florida State Fairgrounds in Tampa. 3,263 people, including wholesale plant growers and distributors, landscape professionals, consultants, and members of the general public, attended the Expo.

Complimentary booth space has been provided to FLEPPC for educational purposes by the Tampa Bay Wholesale Growers at both the 2002 and 2003 events, creating an important educational opportunity. The booth was capably staffed by FLEPPC members Kathy Burks, Brian Nelson, Katy Roberts, and

Bruce Turley, who devoted personal time to making our participation at the event a success.

This is an especially important venue for the FLEPPC message about invasive, non-native plants because of the opportunity to educate and interact with members of the ornamental/horticultural plant industry. Many visitors came to the booth unaware of the problems caused by non-native plant invaders. They left informed and, in some cases, motivated to learn more. In the words of Katy Roberts "I think that this show was a grand success in addressing the problem of education on what, where, and how to deal with *invasive* exotic pest plants." A huge 'thank you' to Kathy, Brian, Katy, and Bruce, and to Hugh Gramling of the TBWG for facilitating FLEPPC's participation in the Expo.

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MS-EPPC Cogongrass Symposium

by Lisa Yager, MS-EPPC Secretary

Introduction

Accidentally and intentionally introduced into the United States in the early 1900's, cogongrass (*Imperata cylindrica*) has since become a serious weed problem in pastures, forests, reclaimed mine sites, and natural areas in the southeastern United States. It is currently documented in 44 of the 82 counties in Mississippi and has become a serious problem for land managers in the southern part of the state. As it continues to spread, land managers in other parts of the state will have to join the struggle to address cogongrass and its impacts. In order to disseminate information about this weed, MS-EPPC held a symposium on cogongrass at the Mississippi Museum of Science in Jackson, MS on December 10, 2002. Speakers presented information on research and other efforts to address the cogongrass problem.

Benny Graves

Mississippi Bureau of Plant Industry

The first speaker, Benny Graves from the Mississippi Bureau of Plant Industry, discussed the formation of a task force to coordinate state and federal agency efforts to address the problem of cogongrass. Lester Spell, Commissioner of the Mississippi Department of Agriculture, initiated the task force at the behest of several landowners. The task force is comprised of participants from state and federal agencies as well as landowners and members of industry. They have identified three broad areas of concern. First, agency personnel and the general public need to be educated about the impacts and control of cogongrass. Second, techniques to control and suppress cogongrass need to be developed or improved. Finally, land managers need to start using the tools that are available to control cogongrass.

In order to assist with efforts to control cogongrass, the task force has created a poster, brochures and a web page with information about identification, biology and control of cogongrass (See: [\[Cogongrass.html\]\(http://Cogongrass.html\)\). They have initiated a survey to identify locations of cogongrass within the state and made efforts to identify sources of funding for education, research, and control of cogongrass. They also hope to promote a noxious weed amendment to the Mississippi Plant Act that would provide the Bureau of Plant Industry with regulatory power to address noxious weeds in Mississippi. Plants suggested for listing include cogongrass, Chinese tallow tree, Florida betony, Japanese climbing fern, purple loosestrife, torpedograss, giant salvinia, hydrilla, and itchgrass. For more information about this proposed noxious weed amendment, contact Butch Alpe, Bureau of Plant Industry, \(662\) 325-8488.](http://www.mdac.state.ms.us/Library/BBC/PlantIndustry/PlantPestPrograms/</p>
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Randy Browning

US Fish and Wildlife Service

The second speaker, Randy Browning, Private Lands Biologist with the US Fish and Wildlife Service, discussed the problems that cogongrass represents for the restoration of the longleaf pine ecosystem. Cogongrass displaces native species and reduces artificial and natural regeneration of pines. It may be allelopathic and is poor forage. It creates very high temperatures when burned, resulting in high tree mortality. It has had a negative impact on numerous wildlife species such as quail, songbirds, insects, and gopher tortoises.

Mr. Browning stressed the need to clean equipment to prevent the spread of cogongrass and also the need for restrictions on its sale as an ornamental by the nursery industry. The ornamental cultivar (Japanese bloodgrass, Rubra, Red Baron) generally reverts back to its native form once planted. Strategies for cogongrass control include burning or mowing in late winter or early spring to remove thatch, repetitive deep disking (if appropriate), and application of herbicides (glyphosate or imazapyr). Treatment will take many years.

He has developed a PowerPoint presentation to be used to educate landowners and land managers on the biology,

dispersal, impacts, and control of cogongrass (available at the web address listed previously).

Jim Miller

USDA Forest Service, Southern Research Station

Dr. Jim Miller of the USDA Forest Service, Southern Research Station in Alabama discussed the region-wide monitoring of invasive pest plants in southern forests by the Forest Service and state partners. However, Mississippi is not participating in their survey. Thirty-two taxa of invasives, including cogongrass, are being monitored for the region. Dr. Miller and others have developed a publication available at www.srs.fs.usda.gov/fia/manual/ or www.bugwood.org/ that provides information on the identification and control of non-native invasive plants of southern forests.

Dr. Miller summarized results of herbicide application trials on cogongrass in loblolly and longleaf forests. Results were best for imazapyr at 25 gal/ac and glyphosate at 10 gal/ac. Late fall was the best time of application and Arsenal (imazapyr) was generally more effective for older patches.

Wilson Faircloth

Auburn University, Auburn, Alabama

Wilson Faircloth, a PhD Student at Auburn University, discussed his research on the control and management of cogongrass. He is looking into glyphosate and imazapyr herbicide treatments combined with planting bahiagrass (*Paspalum notatum*), bermudagrass (*Cynodon dactylon*), crimson clover (*Trifolium incarnatum*) and gulf ryegrass (*Lolium multiflorum*) as potential methods of control. His initial findings suggest that imazapyr's effectiveness is site dependent and that crimson clover provided good suppression of cogongrass in the spring. He has evaluated the frequency of mowing and the use of a Burch wetblade (a lawnmower capable of applying herbicide as it cuts) to control cogongrass. Neither mowing nor the wetblade provided good con-

trol. He is currently evaluating mechanical and chemical treatments that might be effective in facilitating establishment of loblolly pine into cogongrass. He has determined that higher application rates of imazapyr and glyphosate increased mortality of pines and did not achieve greater control of cogongrass. The mechanical and chemical treatments might buy the pines a little time; but that was all.

John Byrd

Mississippi State Extension Service, Starkville, Mississippi

Dr. John Byrd of the Mississippi State Extension Service started his presentation by stating that although invasives represent a big threat economically and ecologically, there is low media reporting. Dr. Byrd discussed how cogongrass is dispersed throughout Mississippi in contaminated soil, ornamentals, hay, and sod. Disturbing the soil in and around the cogongrass patches and failure to clean earth moving equipment has transported rhizomes to uninfested areas.

Cogongrass primarily blooms in the spring, but also may bloom in November and December. Dr. Byrd discussed the possibility that seed dispersal has been discounted more than it should be. He has documented high germination rates for seeds from the coast. The seeds are wind dispersed and he has seen them blowing around from traffic and traveling on vehicles. Mowing during seed production may have facilitated its spread as well.

Dr. Byrd then discussed some ongoing and potential research projects. Like Wilson Faircloth, he has looked at using a wetblade to control cogongrass but results were poor even at different mowing heights. He has obtained some control at

very high rates of mowing, but felt that such rates would not be practical for most situations. He looked at combining soil nutrient addition with mowing but simply got very green cogongrass. Biocontrol agents, techniques from the turfgrass industry for seed head suppression, and use of Roundup-ready corn and soybeans should be researched to see if they provide improved techniques for control and suppression of cogongrass.

Steve Brewer

University of Mississippi, Oxford, Mississippi

The final speaker, Dr. Steve Brewer at the University of Mississippi, described his research examining effects of nutrient addition on invasibility of a longleaf pine savanna by cogongrass. Cogongrass may invade because a niche is available or because it is a superior competitor to the native vegetation. In this study, Dr. Brewer looked at additions of nitrogen and phosphorus on cogongrass encroachment into plots over two growing seasons. Neither nutrient treatment halted cogongrass spread, but phosphorus appeared to reduce the rate of spread. Nitrogen had no effect on cogongrass spread and reduced native plant richness and height. Phosphorus increased heights of native legumes and other plants. Legumes may more directly compete for phosphorus, thus slowing growth of cogongrass.

Dr. Brewer also looked at seed banks within cogongrass and the pine savanna and found much reduced seed bank diversity within the cogongrass patch. This may mean that for restoration to occur, native species will have to be seeded in. He plans to undertake research examining the effects of individual legume species on cogongrass spread.

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Additional Information

To obtain copies of brochures and posters providing information on cogongrass identification, biology and ecology, go to the Mississippi Bureau of Plant Industry website, www.mdac.state.ms.us/Library/BBC/PlantIndustry/PlantPestPrograms/Cogongrass.html or contact them at (662) 325-7765, P.O. Box 5207, Mississippi State, MS 39762. See the following Mississippi websites for additional information.

www.se-eppc.org/states/Mississippi.cfm

www.wildlifemiss.org/magazine/fall02/species.html

www.ms.nrcs.usda.gov/dsbiology.pdf

www.mdwfp.com/wildlifeissues/articles.asp?vol=8&article=110

www.msucare.com/pubs/misc/m1194.html

Internodes

Mark Your Calendar

- *Invasive Plants Conference, August 6-7, 2003*, University of Pennsylvania, Philadelphia. **Contact:** The Morris Arboretum, 100 Northwestern Ave., Philadelphia, PA 19118, 215-247-5777 x159, mabxeduc@pobox.upenn.edu; www.upenn.edu/paflora.
- The 30th Natural Areas Conference, *Defining a Natural Areas Land Ethic, September 24-27, 2003*, Madison, WI. Co-hosted by the Natural Areas Association and the Wisconsin Department of Natural Resources' Endangered Resources Program. The last day of the conference, September 27th, will feature a one-day symposium on *Invasive Plants in the Upper Midwest* (see next listing). **Contact:** www.naturalarea.org
- The *2003 Symposium on Invasive Plants in the Upper Midwest*, part of the 30th Natural Areas Conference (see above listing), **September 27, 2003**, Madison, WI. Participants may register for the entire Natural Areas Conference, or just the one-day symposium sponsored by the Invasive Plants Association of Wisconsin. **Contact:** Kelly.Kearns@dnr.state.wi.us -or- www.ipaw.org
- The 30th Annual Conference on *Ecosystems Restoration and Creation, October 30-31, 2003*, Tampa, Florida. Call for Papers ends June 30th, 2003. **Contact:** fwebb@hccfl.edu -or- pcannizzaro@hccfl.edu; www.hccfl.edu/depts/detp/eco-conf.html
- *Invasive Plants in Natural and Managed Systems: Linking Science and Management, November 3-7, 2003*, Fort Lauderdale, FL. A joint conference and workshop, co-hosted by the Ecological Society of America and the Weed Science Society of America in conjunction with the 7th International Conference on Ecology and Management of Alien Plant Invasions. **Contact:** http://www.esa.org/ipinams-emapi7/

Publications:

- *Weed Ecology in Natural and Agricultural Systems*, by B.D.Booth, University of Guelph, Canada, S.D. Murphy, University of Waterloo, Canada and C.J. Swanton, University of Guelph, Canada. CABI Publishing. 2003. 288 pp. Paperback. £35.00 US\$60.00 1-800-528-4841 www.cabi-publishing.org/Bookshop/index.asp This new textbook links ecological theory to our understanding of natural and agricultural weeds, providing a bridge between basic and applied ecology; it provides examples of natural, managed and agricultural weeds from around the world; and it includes examples from weed and invasive species literature to illustrate ecological principles discussed.
- *Biological Invasions - Economic and Environmental Costs of Alien Plant, Animal and Microbe Species*, edited by D. Pimentel, Cornell University. 2002. 369 pp. CRC Press, Atlanta, GA. \$129.95 1-800-272-7737. www.crcpress.com "...assembles detailed information on components of the invasive species problem from six continents."
- *Invasive Exotic Species in the Sonoran Region*, edited by B. Tellman, University of Arizona, University of Arizona Press. 2002. 460 pp. Clothbound. \$75.00. www.uapress.arizona.edu "...the first comprehensive attempt to address problems posed by expanding populations of exotic plant and animal species in the Sonoran Desert and adjacent grasslands and riparian areas." Contains the first compiled list of more than 500 naturalized exotic species in the Sonoran region.
- New volumes of *Flora of North America* include: Volume 23, *Magnoliophyta: Commelinidae (in part): Cyperaceae*, treating 843 species in 27 genera, including *Carex*, *Cyperus*, *Eleocharis*, and *Rhynchospora*; Volume 25, *Magnoliophyta: Commelinidae (in part): Poaceae, Part 2*, treating 733 species of genera including *Muhlenbergia*, *Paspalum*, *Panicum*, and *Dichanthelium*; and Volume 26, *Magnoliophyta: Liliidae: Liliales and Orchidales*, treating 908 species in 177 genera including *Pontederia*, *Agave*, *Dioscorea*, and *Iris*. All volumes may be ordered from Oxford University Press at 1-800-451-7556 or www.oup-usa.org
- The Florida Bureau of Invasive Plant Management (BIPM) is providing online its *BIPM Fiscal Year 2001-2002 Annual Report*. This 232-page full color report contains information on aquatic and upland invasive exotic plant control operations, biocontrol research, program costs and funding, and more. Look for the links under "What's New" at www.dep.state.fl.us/lands/invaspec/index.htm This is a large (18 Mb) PDF document; a CD version is available upon request. **Contact:** ruark.cleary@dep.state.fl.us
- The Southeast Exotic Pest Plant Council (SE-EPPC) recently added ten new plants to the *1997 Tennessee Exotic Plant Management Manual*. The newly updated manual provides Integrated Pest Management (IPM) plans for a total of thirty species and includes a line drawing for each. Funds were not available for printing copies of the updated manual, however, the text and drawings can be easily downloaded or converted to CD format from the SE-EPPC website: www.se-eppc.org
- *Deeprooted Sedge: An Overlooked Aggressive Weed in the Southeastern United States* is a full color 11" x 14" fact sheet about *Cyperus entriarianus*, a sedge that has become a serious pest in the coastal plain of the southeastern U.S. The fact sheet contains a distribution map, color photos, identification and growth characteristics and other information. **Contact:** Charles Bryson, cbryson@ars.usda.gov
- *The Wild Orchids of North America, North of Mexico*, by Paul Martin Brown, drawings by Stan Folson. 2003. 256 pp. University Press of Florida. Cloth, \$49.95/ Flexibind, \$27.95. 1-800-226-3822 or www.upf.com This annotated guide covers 223 species, 24 subspecies and varieties, and 24 hybrids. Color photographs and line drawings. "[The] best one-volume field guide available for orchid enthusiasts and wildflower lovers..."

Web Sites:

- Go to the **University of Florida Herbarium Collections Catalog** and search the Digital Imaging Projects, *Plant Species Introduced in Florida*, to see high resolution, zoomable (up to 100%) images of approximately 40 species from the FLEPPC Category II list. The resolution is high enough to distinguish very fine details. The project was funded in part by the Florida DEP-Bureau of Invasive Plant Management and made available through collaboration of the UF Herbarium with the George A. Smathers Libraries (UF) Digital Library Center and the Florida Center for Library Automation. Full label data for all of the Category II species on file in the herbarium also will be available soon in the computerized catalog. The Bureau chose Category II species over Category I because they are less well known, thus creating a greater need for available images. Kent Perkins, Collections Manager for the UF Herbarium, hopes to gain additional funds for more images. There are now approximately 500 images online at the web site in projects such as *Potentially Poisonous Florida Plant Species*, *John Bartram's Botany* (St. Augustine to Picolata), and *Floristic Inventory of Kanapaha Botanical Gardens*, all searchable by common or scientific name.
www.flmnh.ufl.edu/herbarium/cat/digitalimagingprojects.htm
- The **Fairchild Virtual Herbarium Web Portal** prototype simultaneously searches through the collections of ten herbaria for the Family/Genus/Species you choose. Herbaria include the Missouri and New York Botanical Gardens, Fairchild Tropical Garden, the University of Florida, Texas A&M, and the British and Swedish Museums of Natural History, as well as herbaria in the Cayman Islands and Costa Rica. www.virtualherbarium.org/vhportal.html
- The **Aquatic, Wetland and Invasive Plant Information Retrieval System (APIRS)** now is in a user-friendly format, thanks to major support from the Florida Dept of Environmental Protection-Bureau of Invasive Plant Management, and the US Army Corps of Engineers-Aquatic Plant Control Research Program (Jacksonville District and Vicksburg, MS). In addition to its 20-year history of collecting the worldwide literature on aquatic and wetland plant species, APIRS has been collecting new and retrospective literature on upland invasive species in Florida, as well as more general literature on invasive species problems worldwide, for the past couple of years. The annotated citations to this literature can be easily found by searching the database's approximately 60,000 records.
<http://plants.ifas.ufl.edu/search80/NetAns2/>

Graduating Students:

- Rachel Tenpenny Sartain, 2003, Master's Thesis. "Physiological Factors Affecting the Management of *Torpedograss*," Agronomy Department, University of Florida, Major Professors: David L. Sutton and Greg E. MacDonald.



In Memory of Randel F. Poppel 1956 - 2003

Randel Poppel was an invasive plant control contractor who owned and operated Randel's Landclearing with his wife Rebecca, and two sons, Laramie and Wyatt. Randel was a master equipment operator and a very conscientious herbicide applicator. The company started working with the Florida Department of Environmental Protection five years ago with modest exotic pest plant control experience. The company quickly became one of our best contractors. This can be attributed to Randel's acceptance of nothing short of perfection from his crews, and a strong desire to always learn more about exotic pest plants, control methods, and the impacts exotic pest plants have on native species.

Randel always was a pleasure to be around. He usually had a funny story or joke to relay that left people smiling or laughing. Randel died in a tragic accident while removing Australian pines from a beach conservation area in Saint Lucie County this past winter. He will be greatly missed by his family and friends, and by the land managers and citizens who appreciate all the great work he accomplished in restoring the natural Florida.

- M. Zeller

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notes from the disturbed edge - chapter 8

“Excuse me...” The voice was pleasant enough on the surface, but it carried just a hint of a condescending undertone, and perhaps even a whiff of superiority. This happened sometimes when they worked in publicly owned natural areas adjacent to private homes, where the residents considered the woods next door to be theirs.

“May I ask what you are doing?” The voice that hailed them emanated from a middle-aged woman in a cardigan sweater with a pair of bifocals balanced on the end of her nose who was standing on the other side of a low fence bordering a back yard, just a few feet away. Oh yeah, this was going to be a good one. He took the lead. “Good afternoon, ma’am, we’re carrying out some land management activities on this property...” As he went on to explain their mission, she watched the woman’s gaze shift to the sloshing contents of the backpack sprayer he wore, and saw the woman’s countenance change from party-polite engagement to concern. She began her countdown: *Thirty, twenty-nine...*

“Oh,” the woman responded, when he had finished describing the nature of their business, “and what is in that contraption?” “Herbicide, ma’am,” he answered matter-of-factly. *Fifteen, fourteen...* “We’re applying herbicide to invasive exotic plants that have become established in this natural area.” The woman responded in a completely rational manner. “Oh, so you’re poisoning our woods?” He continued, unfazed. “Well, actually ma’am, that’s more than a bit of an overstatement. We are carefully applying appropriate chemicals to selected plants in-”. The bifocaled inquirer interrupted. (*Four, three...*) “Oh, you mean like...(*two, one*) Agent Orange?” *Blast Off!* She simply had to figure out a way to cash in on this uncanny predictive talent, but there was no monetary gain in sight here - pure self-satisfaction would have to suffice. Meanwhile, they had some ‘splainin’ to do. This wouldn’t be the first time, and they both knew the

drill. The woman was proceeding to Act Two, Scene One, in which the adjacent property owner suggests alternatives... “Well, that concerns me. If you are really an ecologist, why do you choose to spread toxins in our nature lands? Why don’t you and your helper just cut these...invasive...exotic...” (she could practically see the thesaurus pages flipping in Mrs. Cardigan’s head, but that was good “plants down?”

She stepped in, right on cue, making a conscious effort to keep her eyes from rolling, keeping that Elvis lip in check, refraining from guttural groaning, she (*hey, how come they always assume I’m the helper?*) replied “I am so glad you asked that question.” The woman stared at her as if she had just popped up out of the ground. She smiled a big howdoo grin, and continued. “Simply cutting these plants down wouldn’t kill them. As a matter of fact, it just kind of ticks them off. They’d regrow from the remaining roots. We really need to kill them completely to prevent regrowth. For these particular plants” (she overpronounced “particular” - what a great word) “we can apply herbicide to the stump after we cut them, or...” (she inserted a dramatic pause) “we can, carefully, apply herbicide to the base of the trunk without cutting anything, or...” (she raised her eyebrows, and nodded her head ever so slightly) “we can even apply herbicide to the leaves, and the plant will absorb it and die in place.” She watched the woman’s mental wheels turn, envisioning a view from her poolside lanai of dead stuff. She recommenced her countdown as the woman ruminated and retorted . . . *Eight, seven, six ...*

“Hmm. Well, if the roots are the problem, couldn’t you just (...*two, one...*) dig them up?” (*Oh, get Jimmy the Greek on the phone right now! She was red hot.*) “You know, get rid of the roots?” She initiated the baton hand-off, and he received it flawlessly. “Great thought - but digging up the roots dis-

turbs the soil and creates a place where other invasive exotic plants could germinate and grow - sort of a vicious cycle. We couldn’t be sure we got all the roots, and it’s also very labor intensive, although,” he added quickly, “some land management programs are using prison labor now. We can apply herbicide to 20 trees, without soil disturbance, in the time it would take me and my helper” (*brave man, very funny man*) “to dig one up.” He stopped talking, letting the woman chew on the prison labor scenario for a moment before her anticipated (*ten, nine...*) reply. “Well, labor intensive or not (she hadn’t really heard the soil part), isn’t it better to keep toxins out of our environment? Why, just think about (*two, one...*) DDT.” (*Shazam!*) She lateraled the ball his way.

“Ma’am, the herbicides we use now are a new generation of products. Each and every one has been through comprehensive private and governmental screening and testing to assure that, with proper handling and careful application, they are not harmful to anything except the intended plants.” He could see that Mrs. Cardigan was still on “comprehensive,” so he cut to the chase. “They’re safe - we wouldn’t work with them almost every day if they weren’t. We could give you some phone numbers, or the names of some web sites where you can learn more if you’re interested.”

She began her next countdown, anticipating a final zinger within 20 seconds, and he waited for a reply, but Mrs. Cardigan was silent. Oh well. At least now she knew she was not a total psychic freak. No lottery tickets today.

He wrapped it up. “Ma’am, we need to get back to work.” Mrs. Cardigan nodded, her brain reeling, and even smiled a little. She signed off as they moved on, “Have a nice day, ma’am.” There was work to be done.

- J.A.

An excerpt from “The Adventures of Hack Garlon and his buxom sidekick Squirt.”

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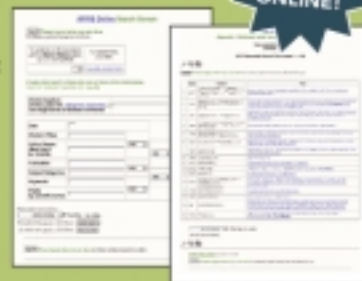


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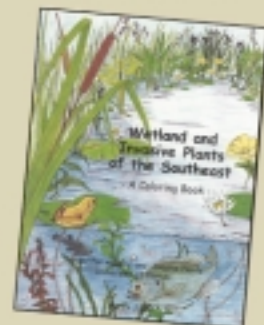
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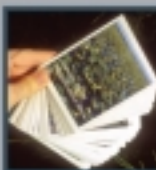
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