

The IFAS Assessment of Nonnative Plants in Natural Areas of Florida: Florida's Land Grant College Answer to Plant Use Recommendations and Invasive Characteristics

By Kenneth A. Langeland, Stephen Luke Flory and Aimee L. Cooper

Introduction

Botanical exploration was a major focus of the United States Department of Agriculture (USDA) during the early part of the 19th century and early 20th century. Their mission was “---- to help find the plant which will produce the best results of any that can be grown, on every acre of land in the United States” (Fairchild 1911). USDA botanical explorers were dedicated to their task and highly successful. David Fairchild, an early botanical explorer (namesake of Florida's Fairchild Tropical Botanic Garden), reported that “over a dozen new things a day are entered in the list of new arrivals” (Fairchild 1906). Over 31,000 “plant immigrants” had been introduced by the early 1900s (Fairchild 1911). That any of these plants would cause economic and/or environmental problems in the future was not foreseen.

Land Grant Colleges were established by Federal legislation in 1862 to provide broad-based education and public benefit; and the Cooperative Extension Service was established in 1914 as the outreach arm of Land Grant Colleges with the role of bringing the results of agricultural research to end users. Early efforts focused on rural agriculture but the role of Extension evolved through the years to include urban and suburban audiences and one of our traditional roles has been recommending plant species for agricultural and landscape uses. We have had the luxury of a rich palette of plant material that began with the many introductions of the early botanical explorers. We have also had, for many years, the luxury of recommending plants without concern for their invasive potential.

While problems associated with weeds (plants growing where they are not wanted) in agriculture, landscapes, rights-of-ways, and waterbodies have long been recognized, the concept of invasive plants or weeds in natural areas is a more recent concern. Scientific concerns were raised in 1958 over the invasion of natural communities by non-native species and the term invasive plant species was introduced (Elton 1958). While weeds have historically been managed for the benefit of crop production, transportation and recreation, it wasn't until the early 1980s that efforts were begun, in earnest, to address problems associated with invasive plant species in natural areas of Florida.

Weed Science has grown to be a major program area of Land Grant Institutions and developing and recommending weed control practices are major roles of Extension, along with recommending plants for agricultural and landscape uses. With growing concerns in the 1980s over invasive plant species in natural areas in Florida, the Institute of Food and Agricultural Sciences (IFAS) within the

University of Florida (UF), Florida's Land Grant College, was called upon to help address the problem.

This article will trace the history of the involvement of IFAS in addressing invasive plant species and explain the IFAS Assessment of Nonnative Plants in Natural Areas of Florida, the basis for our current policy for recommending non-native plant species for use in agriculture and landscapes.

Florida Exotic Pest Plant Council (FLEPPC) List Stirs Controversy

A group of biologists (including IFAS Weed Science faculty) concerned with potential encroachment of melaleuca from the East Everglades into Everglades National Park began meeting in the early 1980s to address this issue. The need to address other weeds in natural areas was realized during these meetings and, as a result, the Florida Exotic Pest Plant Council (FLEPPC) was established in 1982. In their first newsletter in 1991, FLEPPC published a list of 23 plant species considered by the Council to be invasive in Florida's natural areas. In 1993, the list increased to 126 species. Because it contained economically important species, the list became controversial within the horticulture industry and was criticized by IFAS Horticulturists. Industry and academic horticulturists disputed the invasiveness of many species on the FLEPPC list and their major criticism was that it was not clear how FLEPPC determined that these species were invasive. At the same time, IFAS Weed Science faculty were called upon to help develop management practices and Extension information related to invasive species on the FLEPPC list. IFAS administration was asked by FLEPPC (and affiliated state agencies such as the Florida Department of Natural Resources) why IFAS was still recommending species for planting when they were considered invasive by FLEPPC (e.g., Brazilian pepper (*Schinus terebinthifolius*), West Indian marshgrass (*Hymenachne amplexicaulis*), and carrotwood (*Cupaniopsis anacardioides*)). IFAS Weed Scientists were called upon by the administration to resolve these issues.

To answer questions related to invasive plant species, IFAS Weed Science faculty submitted for review in 1995 “Identification and Biology of Non-native Plants in Natural Areas of Florida.” This book provided peer reviewed literature citations, personal communications, and references to various databases that explained why species were considered invasive. Again, because some of these species were economically important to the horticulture industry and reference was made to the 1995 FLEPPC list, opposition

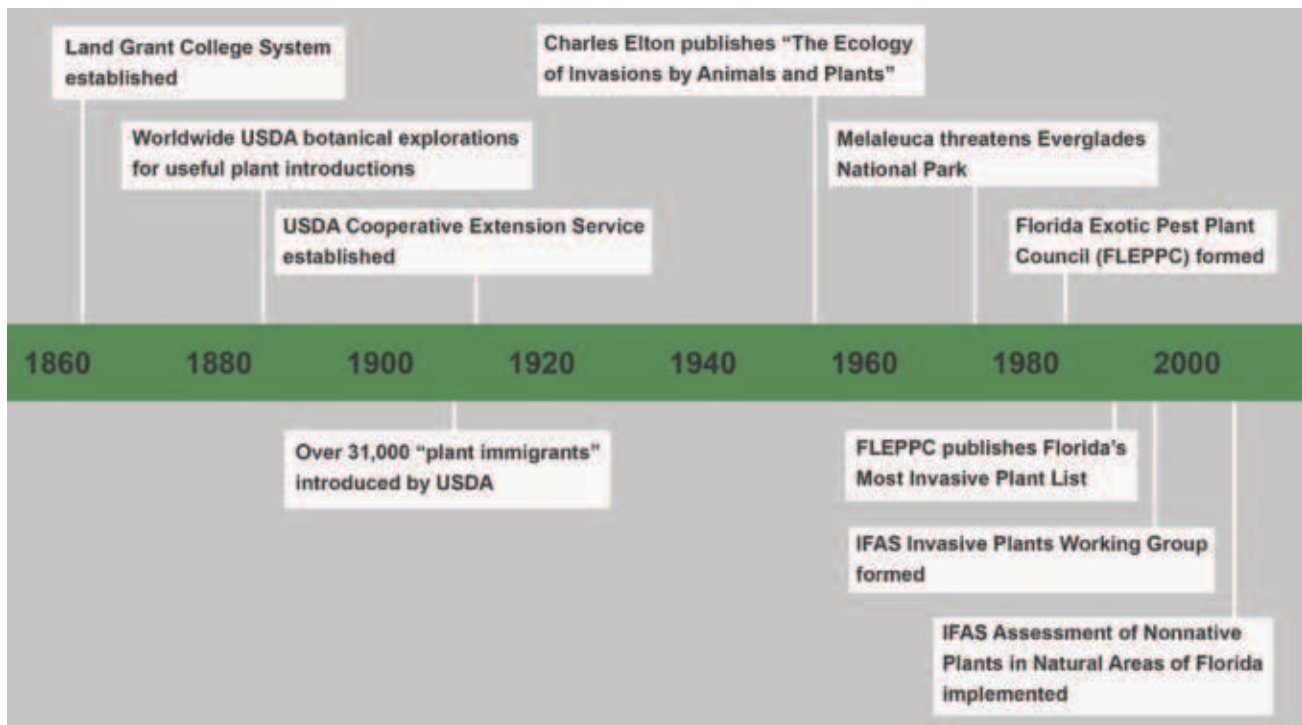


Figure 1. Events leading to development and implementation of the "IFAS Assessment of Nonnative Plants in Natural Areas of Florida."

to publication of the book arose during the review process among certain IFAS audiences and within IFAS.

IFAS Invasive Plants Working Group is Established

In a 1995 memo from the Associate Vice President of IFAS to the Deans of Research and Extension, it was suggested that a working group be formed to coordinate IFAS research and Extension efforts related to "exotic plant recommendations." Subsequently, the IFAS Dean of Extension convened a task force to address invasive plant issues within IFAS, "particularly the potential concerns with commercial invasive plants that have escaped cultivation, to identify which plants are of concern, and to recommend research or educational strategies." A thirteen member multidisciplinary task force was formed with representation from the Departments of Agronomy, Environmental Horticulture, Wildlife Ecology and Conservation, and The Nature Conservancy (Courtesy Faculty in the Botany Department). This task force became what is now the UF/IFAS Invasive Plants Working Group (IPWG) with the original representation as well as the Food and Resource Economics Department and the Florida Nursery, Growers and Landscape Association.

The IFAS Assessment of Nonnative Plants in Natural Areas of Florida

Because the IPWG did not want to rely on outside decisions as to which plant species are invasive and no quantifiable methods existed at the time for determining invasiveness, a subcommittee (comprised of Drs. Alison Fox, Doria Gordon, Joan Dusky, Randall Stocker, and Linda Tyson) was formed to develop a well-defined, transparent

system for distinguishing invasive non-native plant species from those that are not invasive in Florida's natural areas (Fox et al. 2003). Efforts of this subcommittee and subsequent efforts of the IPWG resulted in development of the IFAS Assessment of Nonnative Plants in Natural Areas of Florida (IFAS Assessment), which consists of three parts: the Status Assessment, the Intraspecific Taxon Protocol, and the Predictive Tool. A separate assessment for aquatic plant species is under consideration. Any IFAS publications, including those developed by county faculty, are required to include a reference to "Conclusions" of the IFAS Assessment and to use terms relative to invasive plant species as defined in the IFAS Assessment when describing features of non-native plants. Conclusions and detailed information about the IFAS Assessment can be accessed at: <http://plants.ifas.ufl.edu/assessment/>.

Status Assessment

The Status Assessment developed by the subcommittee was approved by IPWG vote and became operational in 2001. It is implemented by trained personnel under the supervision of a faculty member and the IPWG. The Status Assessment is applied at the species level and only to those plants that already exist in Florida. It uses information on ecological impacts, potential for expansion, management difficulty, and economic value to determine invasiveness of a species. This information is solicited from qualified land managers. For a definitive conclusion, there must be agreement from at least three respondents; otherwise, the assessment is reported as "incomplete information" for the species. A species may receive one of three major "Conclusions": 1) "Invasive: Not recommended," 2) "Caution: may be recommended but manage to prevent escape," 3) "Not a problem species" (See <http://edis.ifas.ufl.edu/ag234>).

Infraspecific Taxon Protocol

In most cases, the Status Assessment is applied to the “resident species,” which refers to a non-native species that is found in Florida. The Infraspecific Taxon Protocol (ITP) was developed and adopted by the IPWG to determine whether recommendations about a particular infraspecific taxon (cultivar, selection, variety, or sub-species) should be the same or different from the resident species. There are a few examples where only the cultivar, variety or sub-species has been assessed (e.g. *Epipremnum pinnatum* cv. Aureum). For an infraspecific taxon to be assessed with the ITP, the Assessment team must receive a request to do so. The request must include: supporting evidence that the infraspecific taxon is recognized as a distinct entity and can be consistently and verifiably labeled; and reasons for expecting the infraspecific taxon to behave differently and, hence, to have different Conclusions from the resident species. Conclusions of an ITP assessment must be accepted by a majority vote from the IPWG.

The ITP has been used to assess cultivars of *Nandina domestica*, *Lantana camara*, *Ruellia simplex*, and *Eucalyptus grandis*. *Nandina domestica* cultivars: Firepower, Gulf Stream, and Harbour Dwarf have been assessed as non-invasive (“Not a problem species”), while Harbour Belle retains the Conclusion of the resident species (“Invasive: Not Recommended”) because of seed production and viability. Four cultivars of *Lantana camara* (T-2, 3, 4, and 9) have all been assessed as non-invasive. *Ruellia simplex* cultivar, “Purple Showers”, has been assessed as non-invasive, as well as three numbered cultivars, while additional study on seed-production and sterility has been required for one cultivar submitted for assessment. Assessment of five numbered cultivars of *Eucalyptus grandis* received the same conclusion as the parent species (predicted to be invasive from the Predictive Tool) however specific uses were approved by the ISWG, which are described in “Approved Specified and Limited Uses” on the Assessment Webpage (<http://plants.ifas.ufl.edu/assessment/>).

Predictive Tool

The Status Assessment directs the use of the Predictive Tool to assess species that: 1) have not yet been introduced to Florida, 2) are present in the state but have not yet escaped into natural areas and are recent arrivals or are known to cause problems in areas with similar habitats and climate to Florida, or 3) there is a proposed or new use for a species that would result in higher propagule pressure (Lockwood et al. 2005) or commercial cultivation of a species present in Florida for a new use or increase in acreage cultivated. The Australian Weed Risk Assessment and the Pacific Second Screening have been adapted for the Predictive Tool of the IFAS Assessment. A species that is found potentially invasive with the Predictive Tool is given the Conclusion

“Invasive: Not recommended” and footnoted in the Conclusions table that it was found potentially invasive with the Predictive Tool.

The Predictive Tool has been predominantly used to assess invasiveness of proposed biomass crops. The Florida Department of Agriculture and Consumer Services (DACS) promulgated law in 2006 to regulate planting of crops in Florida for biomass production (581.083 (4) F.S., 5B-57.011 F.A.C). The rule requires a permit to plant a biomass crop greater than 2 contiguous acres of any species not exempted by the rule. A species exemption may be granted if DACS determines in conjunction with IFAS that the species is not invasive. DACS has requested that IFAS use the Assessment to determine invasiveness of proposed biomass crops (species and infraspecific taxon). It has been necessary to use the Predictive Tool because these taxa either do not yet occur in Florida or represent a new use that will increase propagule pressure. Fifty-six potential biomass crops have been assessed with the Predictive Tool. Twenty have received Conclusions of “Accept” (i.e., Not invasive, e.g. fifteen *Eucalyptus* spp., energy cane (4x *Saccharum* hybrid), giant miscanthus [*Miscanthus sinensis* x *Miscanthus sacchariflorus*], sugar cane (*Saccharum officinarum*), sweet sorghum (*Sorghum bicolor*). Twenty five have received Conclusions of “Reject” (i.e., Predicted to be invasive, e.g. fourteen *Eucalyptus* spp., giant reed [*Arundo donax*], napiergrass [*Pennisetum purpureum*; individual elephant grass cultivars have not been assessed], castor bean [*Ricinus communis*], grain sorghum [*Sorghum bicolor*]). Eleven have received the Conclusion of “Caution” (i.e., Evaluate further).

Comparison of IFAS Assessment and FLEPPC List

Because the IFAS Assessment came about in response to controversy over the FLEPPC List of Invasive Plant Species, it is interesting to compare the two today. The major differences between the IFAS Assessment and the FLEPPC List are: 1) the purpose of the lists and 2) the methods used to place species on the list or in categories. The purpose of the FLEPPC list is to inform land managers about plants that need to be managed in natural areas and for homeowners to know which plants on their private properties are considered invasive in natural areas by FLEPPC. Plants are placed on the FLEPPC list after all published and observational data is discussed by a panel of qualified botanists and listing of the species is passed by majority vote. The purpose of the IFAS Assessment is, as described, an in-house policy for recommendations made by IFAS. Invasiveness of plant species is categorized using a transparent quantitative method of the IFAS Assessment.

Over 700 species have been assessed using the IFAS Assessment. Of these, 89 have received the conclusion of “Invasive: Not recommended” in at least one zone (north, central, south). Of these 89, 50 “may be eligible for specific

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North Carolina Invasive Weeds Awareness Week Event

By Sunny Himes

In celebration of North Carolina Invasive Weeds Awareness Week, the Land Trust for the Little Tennessee and Friends of the Greenway hosted an educational extravaganza about exotic invasive plants and animals on the Little Tennessee River Greenway in Franklin, NC. Over 300 Macon County public school students strolled along the Greenway, visiting educational booths staffed by personnel from the Great Smoky Mountains National Park, Appalachian Trail Conservancy, Watershed Association for the Tuckasegee River, Western North Carolina Alliance, Land Trust for the Little Tennessee, Macon Early College, and Debby Boots, an independent contractor. Wells Farm goats were also on the Greenway to demonstrate a natural method for removing exotic invasive plants. The event was funded by Duke Energy.

In addition to learning a lot about exotic invasive plants, insects, mammals, fish, aquatic invertebrates and the harm they cause, students got to taste various foods made from exotic invasive plants, jump kudzu vine jump ropes, conduct water turbidity measurements on the nearby river, and pet the goats. It was a lovely day to be outside and fun was had by all!

Sunny Himes is Stewardship Associate with the Land Trust for the Little Tennessee in Franklin. Contact her at 828-507-1188 or shimes@lilt.org

John Odell, Resource Management Coordinator with the Appalachian Trail Conservancy, shows Mountain View Intermediate School students how to use various tools to remove exotic invasive plants.



Roger Clapp, Executive Director of the Watershed Association of the Tuckasegee River, a water-advocacy organization based in Bryson City, shows Macon Middle School students how to measure water turbidity.



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uses if approved by the IPWG” but specific uses have only been approved for cultivars of *Eucalyptus grandis*. Of the 700, 29 have received the Conclusion “Invasive: Not recommended” because they have been predicted to be invasive using the Predictive Tool. 116 species have received the Conclusion “Caution: may be recommended but manage to prevent escape”.

The 2011 FLEPPC list (their most current) has 75 species listed as “Category I” in at least one region (north, central, south). These are defined as “invasive exotics that are altering native plant communities by displacing native species, changing community structure or ecological functions, or hybridizing with natives.” This definition is similar to that of the IFAS Assessment.

It is difficult to directly compare the conclusions of the IFAS Assessment with the FLEPPC List because of differences in zones but, in general, there is good agreement between the two. Twenty species listed as FLEPPC Category I are concluded in the IFAS Assessment as “Not recommended” in any zones where the species is expected to grow based on cold hardiness, and 24 are concluded as “Not recommended” or “Caution” in some zones. Twenty eight are prohibited by State and/or Federal law and, therefore, not assessed with the

IFAS Assessment. There is only one species, *Deparia petersenii*, listed as FLEPPC Category I, which, while determined to be found in undisturbed natural areas, was not concluded to be invasive in any zones. Two species listed as FLEPPC Category I have not been assessed.

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Kenneth A. Langeland is a Professor, Stephen Luke Flory an Assistant Professor, and Aimee Cooper a Biologist at the University of Florida/ IFAS Agronomy Department and the Center for Aquatic and Invasive Plants. Contact Kenneth Langeland at gator8@ufl.edu