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The Story Behind the IFAS Assessment of the Status of Non-Native Plants in Florida's Natural Areas[1]

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Introduction

This paper provides the background for, and a summary of, the IFAS Assessment of the Status of Non-Native Plants in Florida's Natural Areas (hereafter referred to as the IFAS Assessment). The actual IFAS Assessment document was developed in 1999 (revised in 2001, 2004 and 2005) by a subcommittee of the IFAS Invasive Plants Working Group, and is available to view and download from the Center for Aquatic and Invasive Plants web site (http://plants.ifas.ufl.edu/assessment.html) or the UF/IFAS EDIS web site (http://edis.ifas.ufl.edu/ag234).

There is a growing awareness of the problems related to non-native invasive species. For example, the Wilcove et al. (1998) report indicated that invasive species are second only to habitat loss in the U.S. as the leading threat to threatened and endangered species. U.S. federal government recognition of these issues was emphasized by President Clinton's Executive Order on Invasive Species issued in 1999. This attention emphasizes the importance of acknowledging that only a small percentage of introduced species create a problem in natural areas (Lippincott 1996), and that quantifiable ecological and economic impacts caused by invasive plants range from negligible to catastrophic.

There are at least two categories of invasive plants that must be addressed: those currently in our wildland habitats, and those that have not yet arrived. Ideally, we could predict "invasion potential" of new species and prevent the introduction of new problems, or at least identify and eradicate them as soon as they are detected. Around the world there is a concerted effort to develop such predictive models (e.g., Australian Weed Risk Assessment http://www.affa.gov.au/content/output.cfm?ObjectID=D2C48F86-BA1A-11A1-A2200060B0A04014), and many of them appear to be efficient at identifying potential problem species, especially based on information such as whether a

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species has been a problem elsewhere. A concern about many of these models has been that they are often overly restrictive, in some cases falsely accusing up to 20% of plants that have never (at least in the studied timescales) been found to be invasive (Reichard and Hamilton 1997). Managers of natural areas may not consider this to be much of a flaw, but this is unacceptable to the many people who believe that supplies of plants for food, fiber, and landscaping should not be unnecessarily restricted.

If predictive models have their difficulties, it seems that it should be easier to identify, describe, and assess invasive plants after they have escaped from cultivation and are appearing in natural areas. However, non-native plants are spread across a continuum of invasiveness that often changes with time. Also, invasiveness is a relatively subjective term, so different people have varying perspectives of what constitutes minor versus significant impacts. It is not hard to recognize the extremes. The invasive "no-brainers" are typically well-established and little-disputed species, many of which are already subject to state and/or federal regulation (i.e., melaleuca - *Melaleuca quinquenervia*, kudzu - *Pueraria montana*, cheatgrass - *Bromus tectorum*, etc.). On the other hand, it is recognized that there are many exotic crops, for example, that do not survive without human intervention in the form of fertilizers, irrigation, etc. Controversy, however, haunts the middle ground and usually surrounds those economically important species that are either just starting to escape or that appear in natural areas but with unknown or poorly documented impacts.

Is Another Assessment Needed?

Since 1984, the Florida Exotic Pest Plant Council (FLEPPC) has been classifying certain plants as Category I ("invasive exotics that are altering native plant communities" based "...on the documented ecological damage caused") or as Category II ("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 lists are revised biennially by a committee of 12 experts within FLEPPC. The lists serve a variety of purposes (see "Florida's most invasive plant list" at http://www.fleppc.org/) with the precautionary objective to alert managers of natural areas to currently or potentially problematic species. Many natural areas within Florida are managed with a policy to remove and exclude all exotic plants. The FLEPPC lists assist managers in prioritizing invasive species for management, since few resource budgets allow removal of all exotic plants.

Things become more controversial when these lists are adopted for other purposes, such as the development of local ordinances banning the use of certain non-native plants. With a large gap between the FLEPPC lists and the state and federal regulations (on the 2005 lists, only 24 out of 67 Category I species and 6 out of 67 Category II species are government-regulated), it is not surprising that proactive local organizations have embraced the Category I list. Such regulations have alarmed ornamental horticulturalists and landscape designers, who question why some economically important species such as coral ardisia *(Ardisia crenata)*, heavenly bamboo *(Nandina domestica)*, and lantana (*Lantana camara*) are on the Category I list. Their concerns are magnified because, while distribution information is available on the FLEPPC web site, systematic written criteria and documentary evidence on which the FLEPPC lists are based are not available.

Conflicting opinions with regard to certain species have been mirrored within the IFAS where some faculty may be recommending certain non-native species for landscaping, while others are supporting the FLEPPC lists and are developing control programs for the same species. In an effort to resolve these internal conflicts, a sub-committee of the IFAS Invasive Plants Working Group was established in early 1999 to develop a tool for assessing non-native plants in Florida's natural areas.

Purpose and Objectives of the Assessment

The primary purpose of the IFAS Assessment is to provide a mechanism to be used within UF to develop consistent descriptions of, and recommendations for, the use and management of non-native plants in Florida. Secondary objectives are to: 1) provide a level of information that is

intermediate between simple presence or absence on a list and all the data that are available on any given species (such as in the FLEPPC / Department of Environmental Protection [DEP] database, or as reviewed by Langeland and Craddock Burks, 1998); and 2) to identify the frequent data-gaps in our knowledge of these species which would assist in setting research priorities. We also hope that the IFAS Assessment provides a tool that will help resolve some of the conflicts identified by the liaison committee between FLEPPC and the Florida Nursery, Growers and Landscape Association (FNGLA).

The requirements for the IFAS Assessment are clear: it should have precisely defined criteria that are defendable by all UF/IFAS faculty, and all evidence and decisions should be documented and archived for anyone to review. Far less is published about most invasive species than desired for an assessment, and anecdotal information can be difficult to defend without further substantiation. Thus, we have defined documentary evidence as being either published and quantitative or as written observations from three biologists, any of whom could be contacted for confirmation. It is also important to recognize that the IFAS Assessment does not substitute for the FLEPPC lists, though some of the data may be useful for the FLEPPC list committee. Neither would this process be a sufficient replacement for formal (and much more costly and complex) risk-benefit analysis, such as is performed in the development of State regulations prohibiting the use of a species.

After reviewing similar assessments that have been developed elsewhere (e.g., Hiebert and Stubbendieck 1993) an early and important decision was to limit the IFAS Assessment**,** as much as possible, to non-predictive information about existing plant populations in Florida. Predictive evaluations are certainly needed for this state, particularly focusing on species not yet introduced to Florida, but the speculation inherent in prediction would jeopardize the credibility of the whole assessment. Additional lessons learned from other assessments were to: provide quick exits from the evaluation for non-invasive species; use multiple questions with simple choices (usually yes or no) but with mechanisms to acknowledge some uncertainty; and uncouple the level of impacts of a species from its current extent of invasion (so an early invader is not automatically rated as of less concern than a widespread established species). It was also decided to divide Florida into three zones (roughly corresponding to USDA growing zones) for which species would be assessed separately, a geographic distinction that was coincidentally incorporated into the 1999 FLEPPC lists. Typically, the IFAS Assessment will be used at the species level, but where there are cultivars that differ in characteristics relevant to this assessment (e.g., sterile cultivars), they should be assessed separately.

General Overview of the Assessment

The IFAS Assessment has five major sections, one to define if a species is invading in Florida, and one for each of four indices - Ecological impacts; Potential for expansion; Difficulty of management; and Economic value, closing with the conclusions. The IFAS Assessment is intentionally broader than just determining whether a species is invasive (e.g., the latter two indices provide important information that does not address that issue), and there is no intention to offset economic value against ecological impacts.

An invading species is defined in Section I as showing the establishment of self-sustaining plant populations that are expanding within a natural plant community with which they had not previously been associated (Vitousek et al. 1995). To be declared as invading, a plant must be documented in natural areas where there has not been significant human disturbance, or it must have survived restoration of the natural communities. This is evaluated within each of the three zones of the State (north, central, and south). A species that does not thus qualify as invading exits from the IFAS Assessment, unless it is known to hybridize with threatened or endangered, or economically-important species.

While continuing to assess a species separately for each zone, the ecological impacts are evaluated in Section II based on the worst known site(s), without or before any control effort. Scores are assigned to six items in this section that address disruption of ecosystem processes, impacts on threatened or

endangered species, competitive displacement, changes in community structure, and hybridization with native species. This impact score is increased if the species can invade a broad range of habitats. If the worst impacts are found in only a small proportion of all invaded sites and if such sites can be defined and avoided, then limited uses of the plant may be specified to reduce the likelihood of such impacts occurring, but this is unlikely to apply to many species.

In zones that a plant has invaded, an assessment of high or low potential for further expansion (one of very few "predictive" questions) is based, in Section III, on the number of new sites reported to be infested in the last five years (using reports from the FLEPPC / DEP database and other surveys). For zones where a species has not yet invaded, the potential for expansion is based on the likelihood that it could survive and cause impacts in the climate and habitats of that zone.

Difficulty of management and economic value are assessed on a state-wide basis and result in scores based on 10 and 4 items, in Sections IV and V respectively. A species is considered more difficult to manage if non-target damage is hard to avoid, if access and methods of control are costly, if there are large or dispersed areas to be managed, or if the likelihood of regrowth and re-colonization is high. Economic value turned out to be the most challenging index because there is no tracking of state-wide sales receipts by species. Nobody, including representatives from FNGLA, was very satisfied with the rather vague items in this section related to retail sales and importance to growers or farmers. Thus, an analysis of the economic impact of potentially invasive plants in the ornamental nursery industry has been proposed as an important area for future research.

IFAS Assessment Conclusions

Authors of IFAS Extension publications that discuss any of the species that have been assessed with this instrument will be instructed to review, and where appropriate, use, the language designated in the conclusions section. For all indices other than ecological impacts, the scores for a species are assigned to a high or low category. Scores for ecological impacts, the index which drives the development of conclusions, are assigned to low, medium, high, or very high categories. Based on the permutations of these high, low, etc. categories for each index, one of the following conclusions is designated by zone for a species:

- *Not considered a problem invasive at this time* (low impacts and potential for expansion);
- *Caution, manage to prevent escape* (low impacts but high potential for expansion);
- *Invasive and not recommended by IFAS faculty unless a specified and limited use has been approved by the IFAS Invasive Plants Working Group* (medium to high impacts);
- *Invasive and not recommended by IFAS faculty* (high to very high impacts).

While this language has no regulatory authority and is obviously superseded by any state or federal prohibitions, it is intended to provide consistent guidance to IFAS Extension personnel in making recommendations for use of these plants. It is important to remember that IFAS Extension programs provide information for our clientele, the end-users, whereas local, state, and federal agencies make regulatory decisions about what species can be planted and where. That an invasive plant may not cause problems in one particular part of Florida is the type of information that we at a university can provide. Whether or not the planting of that species should be permitted is an issue for the regulatory agencies.

All species will be reassessed as new information becomes available (especially in relation to new sites or impacts) and at least every 10 years. Plants with "Caution" or "Specified and Limited Uses" conclusions are to be reassessed every two years.

For a few species with medium impacts and an "Invasive and not recommended, unless specified and limited uses are approved" conclusion, a caveat is included that if specific conditions for use could be defined from which escape and invasion could be

prevented, then specific and limited-use recommendations could be proposed. Such proposals would have to be approved by the IFAS Invasive Plants Working Group. Currently no such proposals have been made, but with educational programs, conspicuous plant labeling, and enforcement of penalties for mis-use, it is conceivable that some plants could, for example, be approved for use only as indoor foliage.

Species that are rated with very high impacts, that score highly on all indices, or that have a combination of medium to high impacts, high potential and low value, are invasive and not recommended for use.

Where Are We Now?

The IFAS Assessment was scrutinized within IFAS and by a number of external reviewers, resulting in revisions and approval for use by the IFAS Invasive Plants Working Group in 2001. Further revisions, most significantly to the wording of the conclusions, were approved in 2004, and some minor terminology changes were made in 2005. We would like to have additional input on the IFAS Assessment itself and on the data that are collected for each species. Other states, such as Ohio and Indiana, have shown interest in adapting this assessment for local use (Fox et al. 2003).

Since developing the IFAS Assessment, more than 200 species have been tested with the formal collection of documentary evidence (results available at: http://plants.ifas.ufl.edu/assessment.html). These species represent all categories for each index and all conclusions, and it is interesting to note that there are regional differences for many species. In their formal assessment, it takes a substantial effort to collect and document the appropriate data for each species and we have several part-time staff dedicated to this task (funded by IFAS and FNGLA). As further results are compiled, they will be made available online. As a large number of species are assessed, we will test the structure and questions in the IFAS Assessment to see if there are redundant or overly influential questions, or to evaluate if there are repeated data gaps. We expect that the IFAS Assessment will continuously evolve both from these internal evaluations and from external input, hence the long-term objective of having an interactive web-based version rather than just the printable format currently available.

There is no doubt that for many species on the FLEPPC Category I list, we will be appearing to reinvent the wheel and the IFAS Assessment will reach similar conclusions. For a few other species there may appear to be a reduced level of concern based on our stringent criteria and requirements for documented evidence. This may seem alarming to managers of natural areas, but we anticipate that this could provide the impetus to gather more evidence, especially for species with expanding ranges, so that problem species are quickly reassessed and recognized. The precautionary approach of the FLEPPC lists is important for the managers of natural areas and should be continued. The IFAS Assessment is intended to complement this system and it is hoped that many people will contribute information on their least-favorite plants.

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