A Giant Reed Conundrum

By Alison Fox, Chair, Florida Exotic Pest Plant Council

ANN MURRAY, UF/IFAS

Arundo donax

Reducing our reliance on fossil fuels for energy production must be an environmentally good idea, right? Doing so using a non-native plant that has been present in Florida for at least 100 years and appears to have behaved well for all that time (and hence is not included on the FLEPPC Invasive Plant List) sounds like a dream situation, surely? Such are the arguments to encourage large scale plantings in central Florida of *Arundo donax* (a.k.a. giant reed, but typically referred to simply as arundo) to produce energy from biomass.

Knowing that there may be very long time lags before populations of invasive species expand dramatically and that several of the same characteristics that make a species good for biomass production (e.g., fast growth, persistence from rhizomes, etc.) are also typical characteristics of invasive species, many people familiar with invasions worry that this could instead become a nightmare situation. In California, giant reed replaces native vegetation along rivers, and is a fire and flood hazard. Add the facts that arundo is a serious invader in other parts of the world, and that being a weed elsewhere is the best single predictor of whether a species will become invasive in a new range, and the potential for unleashing an ecological calamity starts to look even more alarming.

Proposals for green fuel production using large monoculture plantings of arundo have been publicly discussed since at least 2003, but several articles and websites in 2006 suggested that there were more active developments towards biofuel production (e.g., Greener Magazine, May 2006 http://greenermagazine.blogspot.com/2006/05/nations-first-commercial-biomass-to.html) and that tracts of land were actively being sought for arundo plantings. In response to these more tangible moves, the Florida Native Plant Society developed a position paper opposing the agricultural production of arundo for biofuel production due to its invasive characteristics: http://www.fnps.org/committees/policy/pdfs/policyarundo_policy_statement1.pdf. At the same time, FLEPPC gathered information on some of the latest research findings about the invasive potential of arundo and sent them to the Division of Plant Industry (DPI) within the Florida Department of Agriculture and Consumer Services (DACS). That letter is reproduced here:

Florida EPPC
Florida Exotic Pest Plant Council

November 3rd, 2006

Mr. Richard Gaskalla
Director, Division of Plant Industry
Florida Dept. of Agriculture and Consumer Services
P.O. Box 147100
Gainesville, Florida 32614-7100

Dear Mr. Gaskalla:

The Florida Exotic Pest Plant Council (FL EPPC) would like to express our strong concern about any planting of *Arundo donax* (giant reed; "E-grass") for biomass fuel generation in Florida. As you know, FL EPPC is a not-for-profit organization of professional land managers, researchers, consultants, and others designed to support the management of invasive exotic plants in Florida's natural areas by providing a forum for the exchange of scientific, educational, and technical information. As such, we have compiled information about *Arundo* that we would like to share with the Division of Plant Industry.

While we understand that the Division investigated *Arundo* in 2003 when an 8,000 ac biomass fuel project was proposed in Florida, we believe that the new data suggest a very precautionary approach. We are concerned that the current authority of DPI to collect a bond against future control requirements, while critical, may be insufficient for addressing the potential threat posed by this species. Even in 2003, the Florida Invasive Species Working Group (letter from Eva Armstrong, Chair, to Richard Gaskalla, Sept. 8, 2003) recommended that:

> FDACS require both demonstration of control methods and estimation of control costs for established populations of *Arundo donax* in wet and dry habitats in Florida prior to any large-scale use. The ISWG envisions this would take research on established populations (ideally of at least one acre in size – perhaps at Cape Canaveral, along the St. John's River, Pensacola Bay area, Cumberland Island) that demonstrates unambiguous eradication from treated plots. Best management practices need to be developed for plantings of *Arundo donax* and should be required by the regulatory agency. Control cost data should be used by the regulatory agency to develop bond requirements of any entity cultivating the species. The amount of the bond should be sufficient to remediate ecological damage caused by planting or use of *Arundo donax*.

FL EPPC is unaware that any of this testing has been conducted in the intervening time. We do know that, despite repeated efforts, managers at Washington Oaks Garden State Park have been unable to control this species.

In addition, we have new data on the species that in no way alleviates our concern that planting large acreages and producing chips that might be blown far from the cultivated area during storm events poses critical threat to Florida's natural areas. Research presented by Dr. David Spencer (USDA-ARS) and colleagues at the 2006 Aquatic Plant Management Society meeting compared *Arundo donax* from many locations within the U.S., including two from Florida. The researchers examined whether the *Arundo* from California and Texas, where the species is a well documented problem, is a different ecotype (natural variety) than plants from Florida, where *Arundo* currently appears not to be invasive. They concluded that "plants from disparate geographic locations grew equally well under similar conditions." Thus, they found no evidence of ecotypes without the potential to become invasive. I have attached a copy of the abstract since the manuscript is not yet available.

Additionally, as you know, I have been working with Doria Gordon (TNC) and Randall Stocker (UF-IFAS) over the past year to test whether the Australian Weed Risk Assessment (WRA) might be used to prevent introduction of species likely to become invasive in Florida. Our test (final report submitted to you) revealed that the WRA identifies invasive plants in natural area and agricultural systems with high (>95%) precision. It also identifies those species that do not persist without cultivation with the same precision. As in Australia and most other locations where the WRA has been

tested, species that have escaped and become naturalized (some of which will likely become invasive and some of which will not) are identified as non-invaders 30% of the time.

We did not originally assess *Arundo donax* for this test of the WRA, because it was assessed by researchers in Australia and the results used to refine the WRA tool. Their assessment left this species with the unresolved "evaluate further" outcome, demonstrating that insufficient information was available to support a conclusion. We have subsequently conducted an independent assessment and compared our conclusions. We believe that they made three errors in their assessment (given currently available information) that would alter their result: 1) they did not identify this species as a grass (question 5.02); 2) they concluded that propagules are not dispersed by water (question 7.05), while evidence published subsequent to their evaluation demonstrates that floods disperse this species along river corridors; and 3) they could not assess whether *Arundo* is well controlled by herbicides (question 8.03), while evidence from Florida and elsewhere demonstrates that repeated applications of herbicide have not successfully eradicated the species. All of this information is reviewed in the memo produced by Mark Garland for your office on July 2, 2003. If the WRA questions are answered more accurately given the current data, the outcome for *Arundo donax* is "reject" (indicating a prediction that this species could be invasive in Florida).

We do agree that the current infestations of *Arundo donax* in Florida are not aggressively invasive at this time. FL EPPC has not listed this species as either a Category I or II invader. However, we know that: 1) invasiveness elsewhere remains the most consistent and precise predictor of potential invasiveness in a new habitat; 2) it can take well over 100 years for species to move from being cultivated to naturalized to invasive; 3) the number of individuals available for propagule production can explain this lag time, and this species has only infrequently been used in horticulture; 4) the economic and ecological impacts of invasive plant species are sufficiently critical in Florida that efforts must be made to avoid additional impacts; and 5) that even fragments of *Arundo* stems, easily carried by wind events, can produce new plants. This sprouting from stem fragments with nodes has also been documented in the literature (Wijte et al., 2005. Int. J. Plant Sci. 166(3):507-517). The extensive experience of the FL EPPC membership suggests that Florida should not accept the risk posed by large acreage plantings of this species.

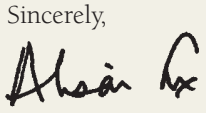
Additionally, we understand the US. Department of Agriculture – ARS has a biological control research project underway on *Arundo donax*. This effort would not have been prioritized if the species were not a critical invader in the United States. If cultivation of *Arundo* in Florida interferes with its possible control in other states where it is already a costly invasive species, conflicts among states and interest groups will be inevitable.

Eradication of this species from areas of cultivation or infestation of virtual monocultures appears questionable even at expenditures of $5,000 to $17,000 per acre (involving combined disking and herbicide application). If it invades existing prairie, wetland, flatwood, and other habitats, control will be even more difficult since the necessary methods will impact sensitive natural areas and many of Florida's native species as well.

Our recommendation, therefore, is that *Arundo donax* be immediately listed by FDACS as a noxious weed in Florida to prevent its use and potential spread. Short of this approach, the type of control research and best management practice development suggested by the Invasive Species Working Group (see above) should be required prior to any cultivation of this species for biomass purposes. Additionally, the bond designated should be sufficient for control of the species both where it will be cultivated, and over the extensive surrounding acreage to which it might escape during hurricane events.

Thank you for your attention to the significant potential for harm to Florida's natural areas caused by *Arundo donax*. Please feel free to contact me for further information.

Sincerely,



Alison M. Fox
Chair, Florida Exotic Pest Plant Council

Cc: Charles H. Bronson
Commissioner of Agriculture

Attachment

"An organization concerned with our environmental future"

Abstract

Comparative growth of giant reed from Florida, Texas, and California.

David Spencer[1], Pui-Sze Liow[1], Gregory Ksander[1], Randall K. Stocker[2], Alison M. Fox[2], and Jim H. Everitt[3]

Giant reed (*Arundo donax*) occurs throughout the southern half of the US from California to Maryland. It is considered an invasive plant in some parts of this range but not others. In order to test the hypothesis that plants from these different regions represented different ecotypes, we grew plants from stem cuttings collected at two sites in Florida, one site in Texas, and two sites in California in a "common garden experiment" in Davis, California. Plants were grown outdoors in top soil or a 50:50 mix of topsoil and sand, in large plastic containers beginning in summer 2004. All plants survived winter conditions during 2004. Plant characteristics were measured at bi-weekly intervals (February – September, 2005) and dry weight was determined after harvest (September, 2005). The number of stems produced per plant was not affected by substrate or plant origin, but did change over time. In contrast, stem height was influenced by time, substrate type, and plant origin. Dry weight differed depending on plant origin and substrate type. However, when data from a variegated form were excluded there were no differences in total biomass due to these treatments. Results, from this single experiment, indicate that plants from disparate geographic locations grew equally well under similar conditions.

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[2]University of Florida, Agronomy Department and Center for Aquatic and Invasive Plants, P.O. Box 110500, Gainesville, FL 32607 USA

[3]USDA-ARS, Integrated Farming and Natural Resources Unit, 2413 E. Highway 83, Weslaco, TX 78596 USA

Richard Gaskalla, Director of DPI, responded to the FLEPPC letter with appreciation for being kept informed and with a summary of the current position of DACS on this issue. After being approached in 2003 by several parties interested in green fuel production, a multi-agency task force was established to review large-scale plantings such as those proposed for arundo.

A result was new language added in 2005 to Florida Statute, Chapter 581.083, F.S. (use "Search statutes" tool with "year=2006" and "search=581.083" in: http://www.flsenate.gov). This statute states that a special permit will be required for cultivation of non-native species in plantings greater than two contiguous acres, unless DACS, in conjunction with the University of Florida, deems the species exempt because it is not invasive. In addition to the permit, a surety bond or certificate of deposit must be provided for at least 150% of the estimated cost of removing and destroying the cultivated plants (a provision to support the requirement that all plants must be destroyed as soon as the permit expires or is revoked).

Acknowledging that there has been some interest in pursuing a large (potentially 15,000 acre), single planting of arundo, Mr. Gaskalla noted that as of late November 2006, however, no one had applied for a permit. Should such an application be made, DACS/DPI plans "a very thorough and deliberate approach to application review and consideration for approval or denial."

Finally, an application to add a plant to the state noxious weed list was attached to Mr. Gaskalla's letter. He suggested that if the FLEPPC felt that arundo should be added to the noxious weed list, we should complete the application and submit it for evaluation by the Noxious Weed and Invasive Plant Review Committee.

FLEPPC is in the process of completing the application at this time.

Our best understanding of invasion and arundo biology suggests that Florida should not accept the ecological or economic risk posed by this species.

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