

Reconciling Plant Introduction and Conservation at Fairchild Tropical Botanic Garden

by Hillary Burgess and Jennifer Possley

Fairchild Tropical Botanic Garden (FTBG) has introduced over 15,000 exotic plants to South Florida since it opened in 1938. Many botanic gardens, including Miami's FTBG, hold plant conservation as a guiding component of their mission. Recognizing that invasive species are a major threat to worldwide biodiversity, these institutions have an opportunity to educate the public about invasive species issues and a duty to set a positive example. FTBG was founded in honor of Dr. David Fairchild, creator of the Section of Foreign Seed and Plant Introduction of the United States Department of Agriculture in 1897. Dr. Fairchild's ambition was to search the world for beautiful and useful plants and to introduce them to our country's economic and aesthetic landscape. This tradition of plant exploration and introduction remains a strong part of the garden's character today. What has evolved is an awareness of the impacts of invasive species and a commitment to responsibly manage the plant collection accordingly. FTBG's approach is focused on the following questions:

1. Prior to introducing a new species to the Garden's collection, how can invasiveness, or potential invasiveness, be screened?
2. How can plants that are already a part of the collection be evaluated for potential invasiveness?
3. How should known invasive species be managed in the garden?
4. And lastly, how can FTBG staff ensure that potentially invasive plants are not distributed to the greater community?



Fairchild staff and volunteers remove *Bonellia macrocarpa* from FTBG property.

ARLENE FERRIS

Bonellia macrocarpa (see cover photograph)

In the 1930s and 40s, Fairchild horticulturists collected several specimens of the shrub *Bonellia macrocarpa* from mountainous regions in the Mexican states of Yucatan and Chiapas. In the ensuing years, approximately ten were planted for display in Fairchild Tropical Botanic Garden, where they flourished for decades. In 1995, Keith Bradley from The Institute for Regional Conservation deposited plant specimens into the Fairchild Herbarium, documenting the escape of *B. macrocarpa* into lake margins in Fairchild's lowlands and in two neighboring Miami-Dade County preserves that share borders with Fairchild. Dispersal of the fleshy, orange fruits of *B. macrocarpa* likely was aided by raccoons and other animals.

Bonellia macrocarpa, a member of the plant family Theophrastaceae, is a variable species that has also been classified as *Jacquinia aurantiaca*, *Jacquinia macrocarpa* and other synonyms. We began removing plants classified under the name *Jacquinia aurantiaca* when they were found to be invasive. The scope of our removal efforts increased as we learned more about the taxonomy of this species complex. The last remaining cultivated plants were removed in 2009, and we are well on our way toward removal of all naturalized plants as well. Everglades Cooperative Invasive Species Management Area (ECISMA) team members gave us a strong head start, and FTBG staff volunteers now remove *B. macrocarpa* on a weekly basis, pulling seedlings by hand or using a cut-stump method of herbicide application using 50% Renovate (triclopyr) diluted in water. Fairchild staff will need to—and intend to—remove *B. macrocarpa* seedlings and runners from the garden for years to come.

Conscientious collecting, purchasing, and trading of plant material are key to FTBG's approach to screening out potentially invasive species. Staff members adhere to all importation laws and FTBG's collection policy, which states that we not collect "plant species known or suspected to be invasive in South Florida's natural areas." When any plant material is brought to the garden, background research is performed to ensure that it is not a known pest plant in our region. The Florida Exotic Pest Plant Council (FLEPPC) List of Invasive Plant Species, the University of Florida-IFAS Center for Aquatic and Invasive Plants, and The Institute for Regional Conservation's Floristic Database Online are invaluable tools in this effort. When collecting from the wild, horticulturalists also avoid plants that are growing abundantly in disturbed places or appear weedy in habit. We are also working on protocol to collect data at the time of plant collection that will feed into the Australian Weed Risk Assessment's Predictive Tool adapted for Florida by the IFAS Invasive Plant Working Group (Gordon et al. 2008), the IFAS Assessment of Non-Native Plants in Florida's Natural Areas. When possible these data will inform decisions on the importation and retention of new plant material.

Once a plant is brought to Fairchild's nursery or public landscape, it becomes a part of the plant collection. From that point, the plant is observed for horticultural characteristics of interest, including weediness. It may take many years for such signs to develop. If a plant is noted to be spreading and difficult to control, it is removed from the collection and seedlings are destroyed. In some cases these plants are valued horticultural specimens. Such was the case with *Haematoxylum campechianum* and *Picrodendron macrocarpum*. Both species were enjoyed in the collection for decades until signs of weediness were observed. The plants were subsequently removed. Most recently FTBG staff members have been controlling the shrubs *Bonellia macrocarpa* and *Lumnitzera racemosa* (see sidebars). These escapes have highlighted the importance of early detection, and are an impetus for more diligent monitoring, evaluation, and editing of the plant collection. Thankfully, the majority of our introduced species have not been aggressive, and can serve as ambassadors to the tropics for visiting scientists and the general public.

As for known invasive plants, FTBG staff uses the FLEPPC List to set priorities for removal of specimens and volunteers from the garden. Since the 1980s, Fairchild staff have

worked to control invasives on the property. Initial efforts targeted the usual suspects – *Schinus terebinthifolius*, *Casuarina equisetifolia*, and *Melaleuca quinquenervia*. Though the parent plants are long gone, we continue to remove seedlings of these species on a regular basis.

Current efforts include a complete evaluation of all FLEPPC listed species in the garden, with plans to remove most, and mitigate the risk of others. Two staff members now lead crews of weekly volunteers that are dedicated to the removal of invasive species. One of these is Rob Ziebro, who has worked several days per week since 2001 on the removal of species such as those listed above, as well as *Colubrina asiatica*, *Rhoeo spathacea*, *Dioscorea bulbifera*, *Wedelia trilobata*, and *Ardisia elliptica*. FTBG staff want to avoid unintentionally promoting these plants as ornamental options to the community.

Since its inception, the garden has introduced new plants to the South Florida community via annual sales and seed distribution programs. Staff members also promote the use of certain plants through articles, classes, web resources for home gardeners, and our Plant of the Year Program. The final question of managing for invasive plants comes at this stage of distribution and promotion. The fact is that the majority of pest plants in Florida were introduced for ornamental or economic interest at a time when there was less regard for Florida's natu-



Fairchild staff and volunteers remove *Rhoeo spathacea* (syn. *Tradescantia spathacea*) from FTBG property.

MARTINE GOURMELON



Lumnitzera racemosa flowers and foliage.

Lumnitzera racemosa

Lumnitzera racemosa (Combretaceae) is a mangrove tree species that Fairchild horticulturists collected from southeast Asia during a 1960s collecting expedition. By the early 1970s, fourteen individuals were planted for display in the Garden. Over the subsequent decades, *L. racemosa* spread into native mangrove habitat surrounding Fairchild. Because mangrove habitat floods with the tides, the floating seeds of *L. racemosa* were carried out into the adjacent mangrove habitat. The invasion went virtually unnoticed for years – not surprising, given that *Lumnitzera racemosa* looks very similar to our native white mangrove (*Laguncularia racemosa*, also Combretaceae), and that few people, let alone those with plant taxonomy skills, ever venture in to the interior of our neighboring mangrove forests.

In 2008, a group of scientists from the U.S. Geological Survey (USGS) and Florida International University visited Fairchild to survey our lowlands for naturalized mangrove species. While they found that most of the introduced mangroves had not spread, USGS scientist and mangrove expert Dr. Thomas J. Smith noticed that *Lumnitzera racemosa* had become invasive. It had spread to cover approximately 15 acres. Though it did not form a monoculture, some areas had very dense seedlings. On the bright side, the infestation appeared to be contained by a grid-like network of mosquito ditches surrounding Fairchild.

On three dates in spring 2009, ECISMA held removal events at FTBG focusing on *L. racemosa*. Over 50 volunteers from all over Florida succeeded in ridding FTBG property of this aggressive tree. By the second and third day, volunteers began working into Matheson Hammock Park, which contained the densest part of the infestation. The group focused on reproductive individuals, but it soon became apparent that additional work would be needed to eradicate all juvenile plants. We continue to work with partner agencies to control *L. racemosa*. Most recently, Lake and Wetland Management, Inc. in Delray Beach has made a generous offer to donate staff time to remove a portion of the infestation, following the results of herbicide trials.

ral beauty and the value and integrity of its ecosystems. Botanic gardens and other plant importers need to do their best to ensure that plants which are being introduced today do not become pest plants tomorrow.

Since the 1970s, plants at FTBG that have been chosen for distribution are carefully observed for invasive characteristics, and are often test planted in home gardens. More recently, researchers and horticulturalists have begun collaborating on the use of the Australian Weed Risk Assessment's Predictive Tool adapted for Florida by IFAS (Gordon et al. 2008). Dr. Hong Liu, a researcher and faculty member at Florida International University, is spearheading these efforts at FTBG. The end goal of this process is to establish the WRA as an important tool in our ongoing evaluation of the plant collection—especially for those species that we intend to promote and distribute to the community.

A recent milestone is FTBG's endorsement of the Voluntary Codes of Conduct for Botanic Gardens and Arboreta. These codes were developed by the Center for Plant Conservation (www.centerforplantconservation.org), and outline an ethic and methods of addressing invasive plants. They will serve as guidelines for FTBG's future efforts to manage our collections responsibly.

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