

Miconia has invaded two-thirds of the island of Tahiti. Landslides like this one are believed to be caused by monotypic stands of miconia. Photo by Paul Holthus.

Operation Miconia: Partnerships as a Pest Control Device

by Pat Bily,
The Nature Conservancy

Hawaii, the most isolated archipelago on earth, has been subject to a plethora of biological invasions in recent history. The diverse cultural 'salad bowl' that peoples these islands is supplemented by countless plants and animals that accompanied these various settlers from their homelands. Among introduced collections were regrettable mistakes or uninvited hitchhikers which have left Hawaii with the worst of the east and west. The US mainland is becoming familiar with some of the introduced pests associated with Hawaii, such as the Mediterranean Fruit Fly, or the threat posed by the Brown Tree Snake. But many are

unfamiliar with the huge impact of invasive plants on the Hawaiian environment, economy, and quality of life. The Aloha State's top pest plant, *Miconia calvescens*, likely the worst weed in the Pacific islands, is profiled here.

Miconia (velvet leaf; *le cancer vert*, - green cancer in Tahiti) is a small tree up to 50 feet in height. Its leaves are opposite, elliptic to obovate with three prominent pale green nerves, and can be up to a 3 feet long. These large dark green leaves, with purple underside, make it a most attractive tropical ornamental. Unlike other showy members in



Huge leaves, rapid growth, and reproduction – up to 20 million seeds annually – give miconia the competitive edge. Photo by Pat Bily.

its family, miconia flowers are small, but the reproductive potential of an older tree may result in the formation of as many as twenty million seeds annually! In Tahiti, miconia takes 4-8 years to reach sexual maturity, although it may take longer in Hawaii. Birds easily disperse the tiny berries. Miconia has an arsenal of competitive features, including a wide range of germination requirements and rapid growth.

Nearly ten years ago, a researcher at Haleakala National Park on Maui was shocked to note the escape of a handsome ornamental plant from a botanic garden (sound familiar?). She had just returned from Tahiti, where this Latin American native plant was dominating the landscape. Now, a similar pattern was being observed in Hawaii. Growing concern developed among land managers across the state, and Hawaii eventually made the plant miconia public enemy #1. This wasn't the first time the alarm was sounded in Hawaii over this striking plant, which was introduced around 1960. Noted botanist Dr. Ray Fosberg warned "It is the one plant that could really destroy the native Hawaiian forest" as he corresponded with a Hilo 4-H Club determined to eradicate this new pest in the early 1980s. Unfortunately, it was a short lived movement that garnished little support, and miconia continued to expand on the Big Island of Hawaii.

When National Park researchers began to observe miconia naturalizing on Maui, a parallel was drawn to its recent history on the island of Tahiti: within 50 years, miconia had invaded two-thirds of the island! Vast tracts of forest

were becoming dense, monospecific stands of miconia. It dominated the forest canopy, leaving little diversity of ground cover in the understory, and threatened Tahiti's native flora and dependent fauna with extinction. Research there indicates that miconia radically changes nutrient, water, and light regimes, and is suspected to be a cause of landslides. The Tahitian study played an important role in warning Hawaii of the potential harm to the island's ecosystems..

Organizing

Organizing containment strategies for this weed took some effort, largely undertaken by Haleakala National Park's research division (now USGS-Biological Resources Division). Key to this campaign was the Park's commitment to stop low elevation miconia infestations before they reached National Park lands (Haleakala National Park is a World Heritage Site). Other natural area managers on Maui were alerted to the potential impact of miconia, and cooperative action was taken to control the core population. This was augmented by public outreach and expanded mapping to locate other infestations.

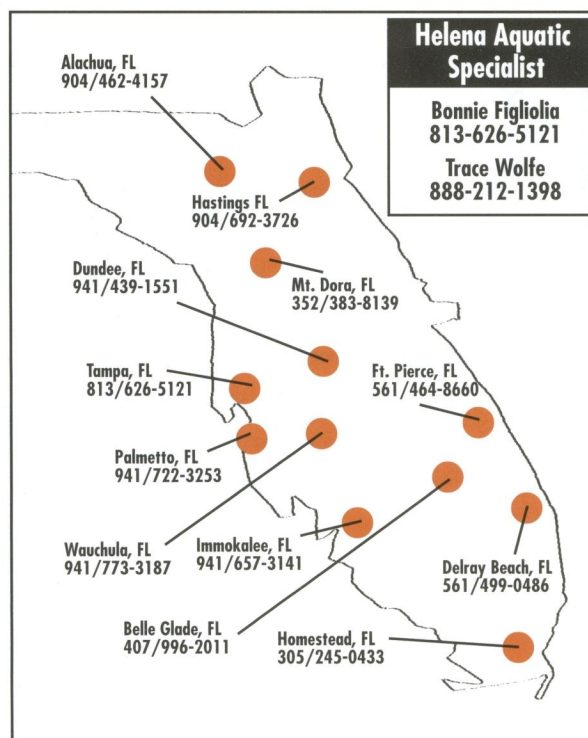
The Melastome Action Committee (MAC) was formed through the USDA Tri-Isle Resource, Conservation and Development Office on Maui in 1991 with the purpose of focusing on strategies and funding sources for controlling miconia and other invasive members in its family. The MAC is comprised of federal and state agencies (including the Research Corporation of the University of Hawaii), as well

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as private conservation organizations. Maui Land and Pineapple Company's watershed manager chairs the committee, and involvement from other private landowners comes through members of the East Maui Watershed Partnership.

Maui County Government has played an important role by funding a work crew to control miconia at Maui's largest infestation near Hana. This miconia crew covers nearly a thousand rugged acres of dense, jungle-covered lava rock, wielding a machete in one hand and spray tank in the other. They are managed by the Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife, an agency that was instrumental in attacking this core population. Their Chief Forester worked with Hawaii Department of Agriculture on a strategy to spot treat outlying mature trees first, creatively using a long-line ball sprayer hung from a helicopter. There are eight other known sites on Maui where miconia was intentionally planted, and these are being contained by The Nature Conservancy of Hawaii's Maui Field Office.

Miconia control has become a statewide initiative. Al-

though this article highlights efforts on the island of Maui, other islands are directing resources toward containment or eradication. Most notably, the Big Island Melastome Action Committee (on Hawaii) has canvassed a partnership of

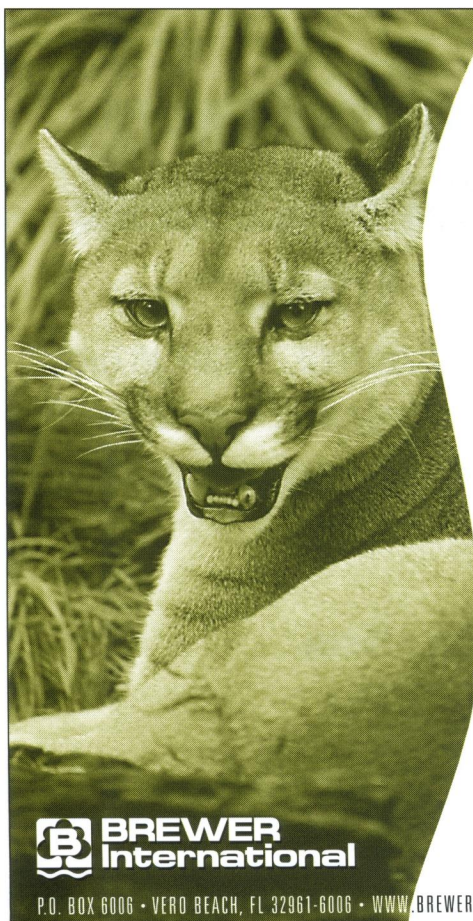
agencies similar to Maui. They face a much larger miconia problem, spread well over 10,000 acres, with fewer resources than Maui. Through additional partnerships, miconia found on the island of Kauai has been eradicated (for the time being), and populations outside of Honolulu on Oahu also have been eliminated. Although miconia control is gradually being achieved for Maui and the Big Island, continued surveillance is essential for the long term success of this containment program.



A media blitz and message from the governor helped launch Operation Miconia. Photo by Pat Bily.

Control

Control of miconia is accomplished by using a combination of manual and chemical methods. Although the shallow rooted characteristic of this tree threatens the stability of watersheds, it allows younger plants up to three meters to be manually pulled. Trials to test herbicide susceptibility were performed using various applications of glyphosate



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Careful monitoring helped determine effective herbicide controls for miconia.

and triclopyr. Although glyphosate trials using foliar, cut-stump, and injection methods yielded mixed results, low rates of triclopyr amine have been effective with foliar and stump treatments. Triclopyr ester, applied in low volume rates with oil carriers, has been used successfully for basal treatments of large trees. Pre-emergent herbicides have not been tested, although miconia's persistent seed bank presents a case for experimentation. A biological control agent was released at Maui and Big Island sites: the fungus *Colletotrichum gloeosporoides* f.sp. *miconiae* is beginning to establish, damaging miconia's leaves. Other biological control agents are currently under investigation, but with the expense of research and screening, funding is limited.

Survey and Mapping

Mapping techniques for miconia are still in the early stages. Obstacles to locating satellite populations are thick vegetation, inaccessible terrain, and unclear vectoring sources (birds, humans tracking seed). Feral pig hunters and hikers going into remote areas have been a great resource, reporting miconia locations to a Hotline phone number. Global Positioning Systems are used on the ground and in the air to produce accurate maps. Multi-spectral remote sensing is being attempted to identify miconia outliers from aerial photographs, with hopes that infrared images will show miconia among the vast forests of the East Maui Watershed. Currently, low-flying helicopter reconnaissance is the best aerial mapping method.

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Public Outreach

Public outreach concerning miconia awareness was addressed early with a color 'WANTED' flyer distributed throughout schools, communities, and garden shops. Public service announcements on TV successfully reached target audiences (Kauai's infestation was reported from a viewer seeing one of these during a University of Hawaii football game!). In 1996, Hawaii's governor called a state of emergency on this weed, officially launching the 'Operation Miconia' campaign statewide. Local TV, radio, and newspapers have covered stories related to the miconia battle, especially when volunteer work parties from the community take on removal efforts. For the electronically inclined, there is a miconia web site managed by the Hawaii Ecosystems At Risk (HEAR) project. For those wanting to know more about this plant and other Hawaiian weeds, <http://www.hear.org> is a great source of information.

Why make such an effort to contain one pest plant? The costs of coping with disruptions caused by weed pests are cumulative, whether they're based on protecting agriculture, watersheds, or biodiversity. Past experience indicates that early containment of many of our currently widespread weeds might have saved billions of dollars. Nature reserves in Hawaii spend over 75% of their resources battling invasive species. Responsibly managing watersheds is also extremely important for island communities. Fast-growing weeds like miconia also present agricultural, highway safety, and rights-of-way issues.

Many natural area managers in Hawaii feel the impact of this one plant could be devastating to the islands' delicate native ecosystems. Over 90% of Hawaiian biota is endemic, found nowhere else on earth. Evolutionary patterns in Hawaii are the subject of research worldwide (it's been suggested that Charles Darwin 'missed the boat' by studying the Galapagos instead). Hawaii's natural heritage is not just a valuable asset for its residents; besides containing the United State's only tropical rainforests, these islands are an important resource for Planet Earth.

The education reached through Operation Miconia has helped set the stage for raising awareness of the alien species dilemma in Hawaii, so that the general public might be able to view invasive plants as a form of biological pollution.

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The Newly Established

Southeast Exotic Pest PLANT COUNCIL

by Brian Bowen,
SE-EPPC Coordinator

SE-EPPC Becomes Established

The Southeast Exotic Pest Plant Council (SE-EPPC) was formally established on March 20, 1999 at the first annual Southeast Exotic Pest Council Symposium hosted by the Tennessee Exotic Pest Plant Council in Oak Ridge, Tennessee. The Council was officially formed by a motion from the floor that was approved by those attending the SE-EPPC roundtable discussion during the final session of the symposium.

Immediately following the TN-EPPC business meeting, the first SE-EPPC organizational meeting convened; approved organizational bylaws, and elected a provisional Board of Directors and Officers. The Board represents Tennessee, North Carolina, Kentucky, Virginia, South Carolina, and Georgia. Florida was given an ex-officio position on the Board with opportunity for full participation open to future consideration. Other Southeast states not represented at this meeting will hopefully join and become Council members in the near future.

Organization Structure

SE-EPPC is established as an umbrella organization under which there are subunits. The proposed subunits consist of state chapters, affiliates, and individuals. The state chapter is the most functional unit with a board of directors to initiate action within each state's respective political boundaries. An affiliate occurs in the absence of a state chapter where activity on this issue is based in an existing organization, i.e., an invasive exotic pest plant committee of a state native plant society. In states where there is no organization, individuals are simply members of SE-EPPC.

Since the state chapter is the most functional unit, the Southeast Exotic Pest Plant Council will foster the development of state chapters within the Southeast. State chapters essentially operate autonomously but are required to ad-



SE-EPPC's Coordinator, Brian Bowen (above) is busy laying the groundwork for the regional organization.