Kia'i i Nā Moku o Maui Nui

"Guarding the Islands of Maui County" Summer 2010

Newsletter of the Maui Invasive Species Committee

The 2009 International Miconia Conference: Pulling It All Together

By Shannon Wianecki
MISC Newsletter Editor

With each hairpin turn of the Hāna Highway, a new vista reveals itself. Rainforested cliffs plunge into the deep blue Pacific. Waterfalls send rising mists into tangles of ferns and flowers. Pure white tropicbirds soar above vine-covered green hillsides.

As spectacular as it is, the road to Hāna isn't lined with pristine forest. Its bamboo and ginger patches are alien introductions, having replaced rare Hawaiian species that now exist only in pockets. Higher up the mountain, above the areas seen by most people, the forest still supports a functioning watershed with a healthy diversity of understory plants. But one alien species threatens to change that: *Miconia calvescens*.

Miconia, a slender South American tree with giant leaves, has been strangling Pacific Island rainforests for four decades. Left uncontrolled, it would compromise critical watersheds throughout the Pacific.

The Maui Invasive Species Committee hosted the 2009 International Miconia Conference in May at the YMCA Camp Ke'anae, not far from the island's primary miconia infestation. In the tin-roofed gymnasium, over one hundred scientists, resource managers and field technicians gathered to swap stories, strategize, and pledge support. While the setting was rustic, the content was cutting-edge. Like many, I sat on the edge of my fold-up seat, listening to the latest breakthroughs in miconia research and control.

Presenters with far-ranging accents—from Australia, Hawai'i, French Polynesia, New Caledonia, and Central and South America—took turns at the podium, describing how their work furthers the battle against a plant they all know to be a formidable opponent.

Keynote speaker Alan Holt of The Nature Conservancy opened the conference by congratulating Hawai'i, calling its invasive species committees "the envy of virtually every other state in the U.S." He joked, "The good news and the bad news is: you are the best in the world."

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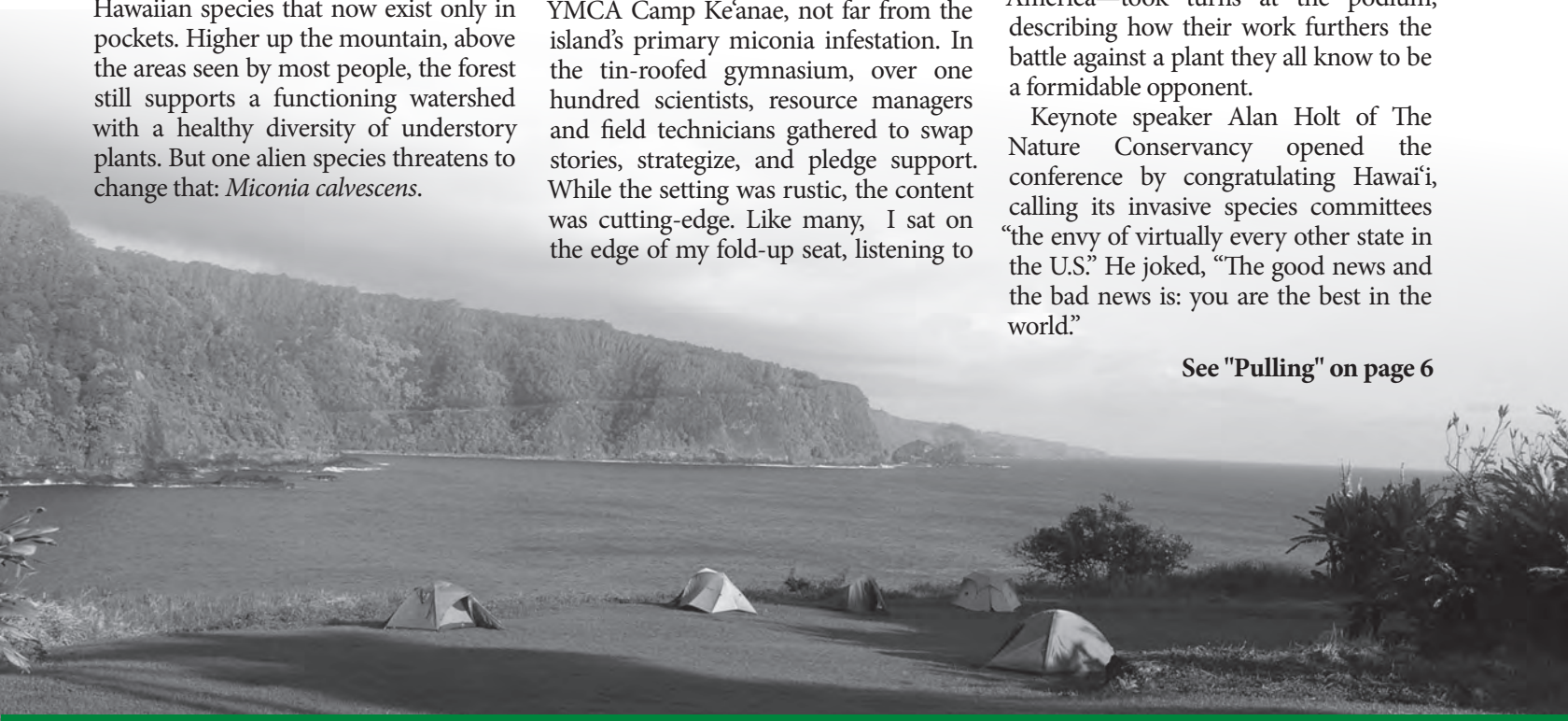

In this issue:

Message from the Manager

"Lacking any conference-hosting experience, international or otherwise, we thought, 'How hard could it be?'"

By Teya Penniman
MISC Manager

Several years ago I attended a public meeting where a local doctor likened a worrisome disease to miconia for its ability to spread quickly and cause devastation. I marveled that miconia had become an icon for things invasive. Perhaps it wasn't so surprising. After all, we've been talking about miconia to anyone who will listen for nearly twenty years, ever since its initial detection in Hāna.

We're still talking about miconia, but the conversations documented in this newsletter are global in origin and focus. The voices come from the 2009 International Miconia Conference, hosted by MISC in May.

We can credit Dr. Lloyd Loope for including the conference in a research proposal submitted to the Hawai'i Invasive Species Council. Loope had participated in the 1997 Tahiti miconia conference and thought it was time to review progress since then. We're not sure whom to credit (blame?) for suggesting that Maui host it. Lacking any conference-hosting experience, international or otherwise, we thought, "How hard could it be?"

MISC partners and staff began to identify conference goals: bringing together the world's experts on miconia, showcasing our work, and recognizing our partners. Perhaps most daunting, we wanted our international colleagues to see a miconia invasion on a Hawaiian Island.

Those goals—especially that of hosting a massive work trip in miconia-infested forest—ruled out a resort-based conference. The only venue with adequate meeting space that could easily get us into the East Maui infestation was the Ke'anae YMCA: a campground located along Maui's rugged, rainy northern shore, equipped with dormitory-style bunkhouses, a commercial kitchen, and a sweeping view of the Ke'anae peninsula. Not your typical meeting venue. And one that several site visits proved could be a drenching, muddy mess. Undeterred, the committee dove in.

We found a Hāna caterer, tents, musicians and a *hula hālau*. We began stockpiling different sizes of pants, boots, shirts, and gloves, and blazing the word "miconia" on them in bright orange letters. We created a website. We asked for help covering additional costs. Dr. Loope invited key miconia researchers from across the Pacific and from miconia's native range, where research is occurring on biological control agents.

To our delight, they came. One hundred and ten participants representing eight countries traveled vast distances to Maui. The audience was a veritable who's who in Hawaiian conservation. Staff from all five Hawai'i Invasive Species Committees came as well. They crammed into vans headed to Ke'anae, pitched tents or claimed bunks, and settled in. Community members, local media, and elected officials also participated in the four-day meeting.

In retrospect, we were honored to host the conference. Thanks to outstanding weather, a unique venue, diligent planning, *'ono* (delicious) catering, awesome vendors, generous financial support, and most importantly, the dynamic and knowledgeable attendees, the 2009 International Miconia Conference was a resounding success. I was left with a sense of shared commitment to protecting native forests and watersheds across the Pacific, and gratitude that there is a whole lot more than just talk happening to stop the spread of miconia.

The articles for this newsletter represent the breadth and quality of work occurring around the world on miconia. Eager for more? The proceedings from the conference will be available online at the conference website: www.hear.org/conferences/miconia2009.

Conference committee members: Teya Penniman, Perry Bednorz, Jeremy Gooding, Stuart Funke-d'Egnuff, Elizabeth Anderson, Tanya Vasquez, Brooke Mahnken, Lissa Fox, Lloyd Loope, and Pat Bily (not pictured).

Kia'i i Nā Moku
o Maui Nui

"Guarding the Islands of Maui County" is the official newsletter of the Maui Invasive Species Committee. To join our mailing list please call 573-6472 or email miscpr@hawaii.edu.

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The Maui Invasive Species Committee is a partnership of government, non-profit, and private organizations working to protect Maui County from the most harmful invasive plants and animals.

MISC works to prevent invasive species from becoming established, controls invasive species on private and public property free of charge, and educates people about how to protect Maui County.

The Time Seemed Right

By Lloyd Loope, Ph.D.
Research Scientist
United States Geological Survey-Biological Resources Division

In September of 1980, I arrived on Maui with the challenging job of providing scientific support for Haleakalā National Park's long-term mission to protect Hawaiian plants and animals. During my first decade on Maui, insightful mentors and diverse experiences with invasive species honed my confidence in recognizing a mega-problem when I saw it.

Miconia was already here but we didn't know it. Park employee Betsy Gagné happened to spot a miconia tree on a Nāhiku roadside five miles from the Park, and in January of 1991, she and I embarked on a fact-finding mission to scope out the problem. Our discoveries that day ultimately led to a statewide campaign against miconia.

Nearly two decades later, I feel a deep responsibility for helping MISC and statewide partners forge a sustainable, long-term strategy against this formidable weed tree. Miconia threatens to impoverish rainforest biodiversity and degrade watershed integrity. Given the substantial cost and complexity of the existing miconia control program, we need to continually refine our approach.

Jean-Yves Meyer provided an inspiring example by hosting the First Miconia Control Conference in Tahiti in 1997. Ten years later, Jean-Yves and I were able to meet Australian scientists involved in miconia research at a major invasive plant conference in Australia. We realized that the new ideas and wisdom coming from Australia could help inform the miconia control effort in the Pacific region. We also realized that biocontrol efforts were in need of better understanding and support. When a funding opportunity arose, the time seemed right for a second conference to bring together the people with the best ideas in the science and management of miconia.

The entire 2009 International Miconia Conference was stimulating, but I most appreciated the reports of

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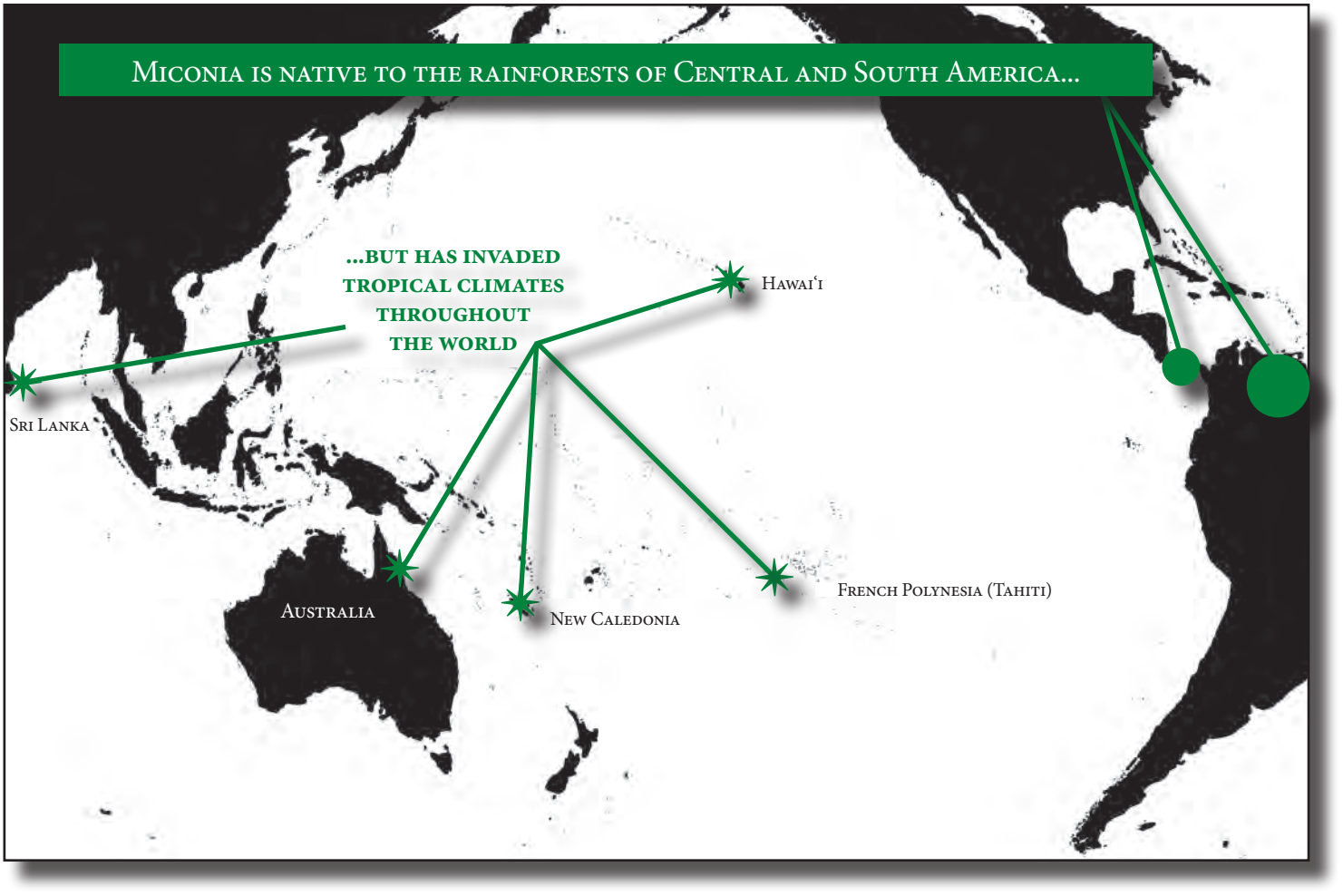
Miconia, a plant out of place...



"Time" continued from page 3

Professors Robert Barreto from Brazil and Paul Hanson from Costa Rica. They were enlisted by University of Hawai'i Professor Clifford Smith to engage students in finding and testing potential biological control agents. They searched in miconia's native range for natural enemies capable of neutralizing miconia invasions elsewhere. Reporting on ten to fifteen years of work, they effectively conveyed the sheer excitement of biological discovery. Hawaiian miconia field crew workers took in these presentations with fascination, while Barreto and Hanson were equally fascinated to see—for the first time—strikingly dense stands of miconia in Maui's core infestation.

Simple containment of this fast-spreading weed is so demanding that resources to address other threats are scarce. Increasing energy costs of the crucial helicopter surveillance and control of miconia are a worry. I believe we have to find a way to harness biological control toward an effective solution. An optimal transition from physical and chemical control to biological control is essential.

Tracy Johnson of the U.S. Forest Service and Darcy Oishi of the Hawai'i Department of Agriculture estimated that a series of potentially effective biological control agents for miconia (including pathogens and insects already well known from work in Costa Rica and Brazil) could be released in Hawai'i within five to fifteen years. The timing will likely depend on the level of funding for testing within Hawai'i. Unfortunately, the current economic recession challenges all aspects of miconia containment.

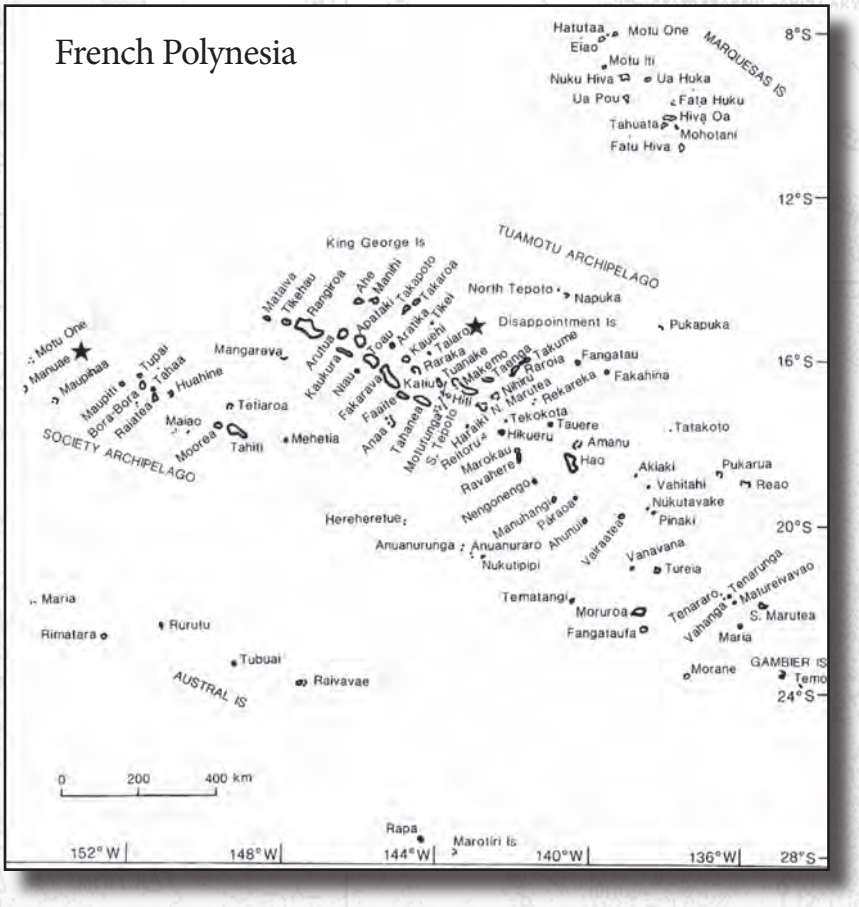
The conference laid out what is needed for MISC – sustaining mechanical and chemical containment efforts in the short run, while finding ways to augment resources for an accelerated and effective biological control program. There is certainly no room for any less than maximum dedication and creativity from all of us in the Hawai'i conservation community.

The Miconia Saga in French Polynesia

By Jean-Yves Meyer, Ph.D.
Research Scientist
Délégation à la Recherche, French Polynesian Government

Scientists first became aware of miconia's invasion of Tahiti in 1973. The French botanist Jean Raynal of the National Museum of Natural History wrote in a short note after a field trip to Tahiti that the species could become "the number one enemy of the Tahitian vegetation." Two years later, the conservation group "Ia Ora Te Natura" (French Polynesia's first such group) warned local authorities about dense stands of miconia. The species had been introduced as an ornamental plant ina botanical garden of Tahiti in 1937 and was still sold in garden stores until the early 1980s. It was not widely considered a big threat, and nothing was done.

A research program was eventually launched in 1988, both by the French research organization ORSTOM (the present-day Institut de Recherche pour le Développement) and the French Polynesian Government. The goals were to study the bio-ecology of the plant, its origin, distribution, and impacts on the native biota, and to search for control methods. By that time, miconia had already covered about two-thirds of the island of Tahiti (198,000 acres / 80,000 hectares) from sea level up to 1400 m elevation, forming dense mono-specific forests that had progressively replaced the native rainforests and montane cloudforests.



Miconia has become the most important threat to the rich and unique biota of Tahiti. It's considered one of the most dramatic examples of a plant invasion in an island ecosystem anywhere in the world.

In 1992, manual and chemical control campaigns were initiated by the forestry section of the Service du Développement Rural (Department of Agriculture) on the island of Raiatea. Miconia had been introduced in different valleys around the island between the 1950s (as an ornamental) and the 1980s (as a soil contaminant). It has since spread over 470 hectares (1,160 acres). More than 2.2 million plants have been destroyed on the island during the last eighteen years of active control, with the voluntary help of schoolchildren, local conservation groups, religious groups, and the French Army. While the spread has been contained, eradication has not been achieved.

A milestone event in the miconia research and management program was the organization of the First Miconia Control Conference on Tahiti in 1997. The conference brought together Hawaiian and French Polynesian scientists and managers to find more efficient solutions. A collaborative agreement to develop a biological control program was subsequently signed with the Hawai'i Department of Agriculture

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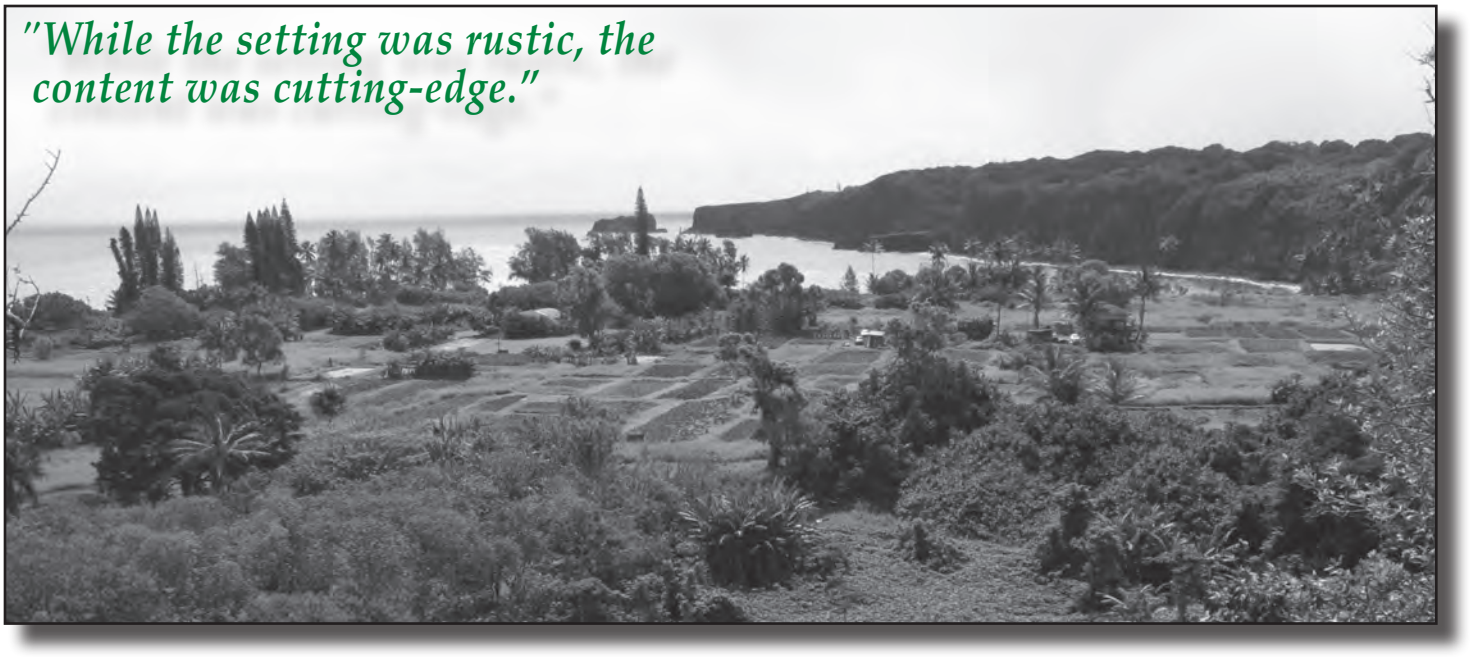

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He urged those working in the field to advertise their successes, especially when they aren't obvious. "We want to promote that most important victory of all: the eradication before it becomes a problem."

The audience later learned that Hawai'i has several such victories to report: repeated aerial surveys of Moloka'i have detected zero miconia plants. Kaua'i hasn't had a mature plant since 2004.* These "negative" data show that prevention and rapid response are working. If and when miconia arrives on uninfested islands, field crews will know. The plant won't have a twenty-year grace period to spread unnoticed, as it did on Maui, O'ahu, and Hawai'i Island.

Jean-Yves Meyer reported from French Polynesia, where miconia moved like a bulldozer through Tahiti's forest, replacing native plants and trees with a clone-like army of itself. Massive education and control campaigns have contained its spread on neighboring islands.

If it's hard to imagine how a plant can single-handedly undermine a watershed, University of Hawai'i researcher Thomas Giambelluca's presentation helped explain the process. First, miconia's enormous leaves deprive understory plants of sunlight, thereby reducing the groundcover that acts as a forest's natural sponge. Compounding this, the water droplets that fall from miconia leaves are typically larger than those falling from other trees or directly from the sky. These large droplets are more likely to cause erosion.

Several conference attendees from Australia shared data models, illustrating the efficacy of various search strategies, the genetic profiles of miconia infestations, and the behavior of miconia-spreading birds. Such information helps managers forecast where miconia might pop up next and how to maximize their resources on the ground.

On day two, the conference's focus sharpened. All seven presenters discussed biological control: its costs and benefits, success stories, the process of selecting effective agents, and the superiority of pathogens, or plant diseases.

Andy Sheppard, a leader in plant biosecurity and invasive species research in Australia, set the stage. He gave an overview of how transformer weeds break ecological rules, and described the qualities of a successful biological control agent. "While pathogens are the most effective natural enemies," he said, "they are undervalued and over-feared."

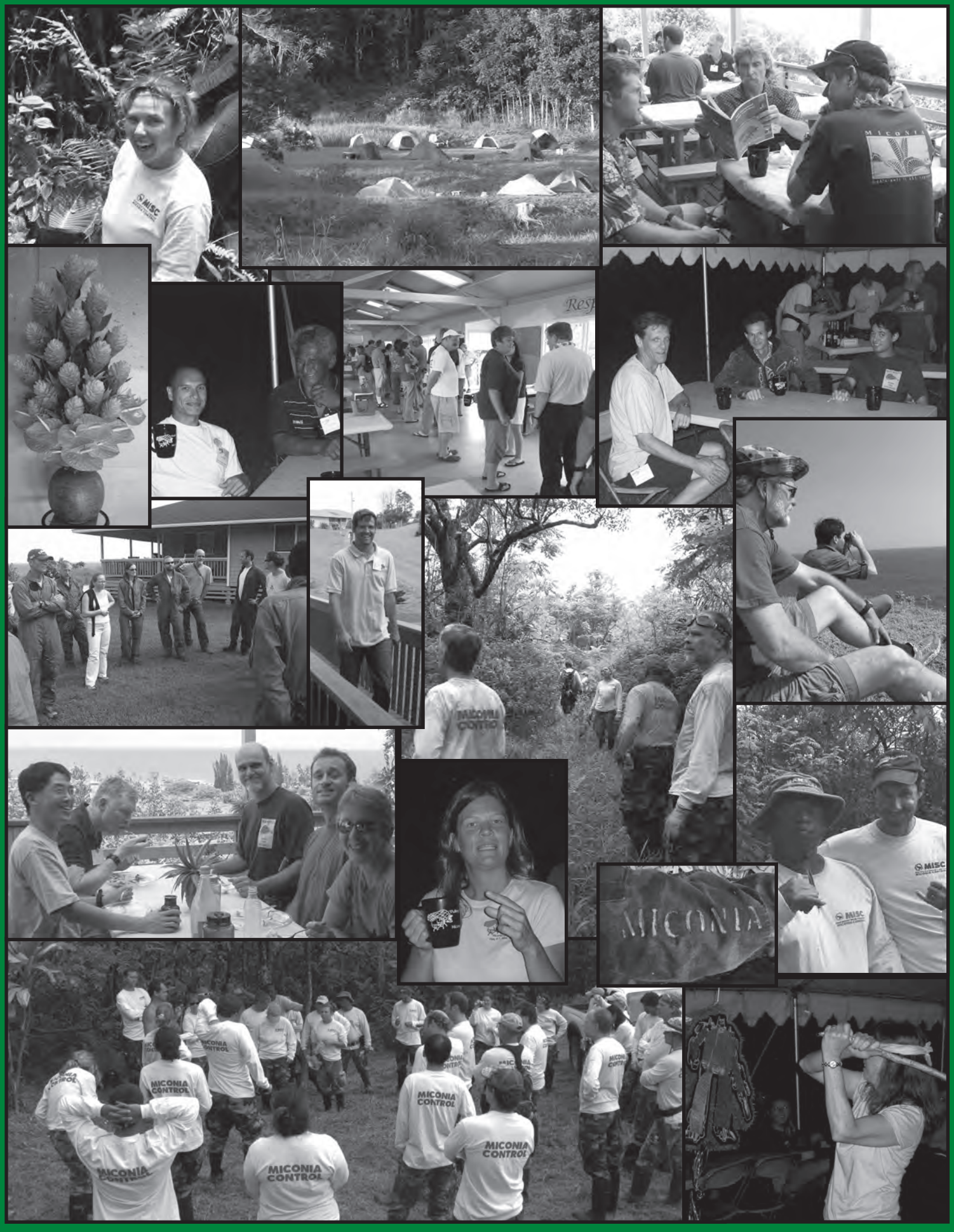
Tracy Johnson, an entomologist with the U.S. Forest Service, summarized the current status of potential agents. He suggested that for Hawai'i, the stem-boring weevil, *Cryptorhynchus melastoma,* is among the most promising. As indicated by its name, it is intimately dependent on melastomes—a family of invasive plants that includes miconia and tibouchina. Robert Barreto, a mycologist hailing from miconia's home range in Brazil, argued that plant diseases could be more effective than insects, considering their superior potency.

Kim Burnett from the University of Hawai'i broke down the costs of mechanical control (hand-pulling plants or spraying them with herbicide) compared to biological control. She demonstrated that investing in the development of miconia's natural enemies was far and away the least expensive and time-consuming option.

The informal and remote nature of Camp Ke'anae meant that miconia-dominated discussions carried on well into the evening, some amidst the background sounds of sweet Hawaiian harmonies. Breakout groups shared expertise and brainstormed solutions to common problems. Field trips included a visit to a seabird sanctuary and a native plant hike. The miconia work trip was the most popular and arguably most productive: an estimated 4,600 plants were pulled or treated during the excursion, giving life to the conference title of "Pulling it all Together."

It's safe to say that, for each who attended, the 2009 International Miconia Conference revealed a new vista—a hopeful landscape where miconia's fateful march into the rainforest has been reversed.

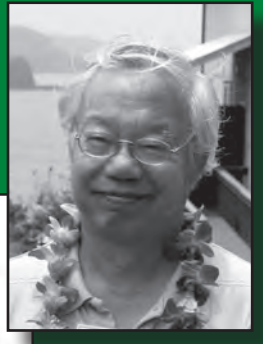
** A single mature plant was found on Kauai and controlled in late 2009.*


MISC
MICONIA
MICONIA CONTROL

Putting the Human Face on Biological Control Research

Paul Hanson is a professor at the University of Costa Rica and directs a research project aimed at identifying and studying the natural enemies of miconia.

Mann Ko is a plant pathologist with the Hawai'i Department of Agriculture Plant Pest Control Branch and has done extensive research on nematodes, a potential biological control for miconia.



An Army of Weevils: The Search for Effective Miconia Controls

By Lissa Fox
MISC Public Relations & Education Specialist

"Miconia is the worst weed in the world," says Tracy Johnson, an entomologist with the U.S. Forest Service. Johnson has logged ten years working to find a predatory insect or disease to control the South American plant that wreaks havoc on rainforest ecosystems throughout the Pacific.

As miconia control in Hawai'i enters a second decade, invasive species biologists and field crews recognize the need for an effective, powerful long-term strategy. They have searched for the silver bullet that could stop the unstoppable—but no such answer has arisen out of the experience in Hawai'i. Instead, the most promising solutions might just be crawling through the jungles where miconia originated.

On the island of Maui, where large tracts of rainforest are riddled with miconia, control has come in the form of ground crews and helicopters. It's an expensive, labor-intensive strategy that has succeeded in slowing the spread of the plant that would otherwise transform the Hawaiian rainforest. There is no clear end in sight. Worse still: any significant interruption in miconia control will cause an explosion of miconia plants, undermining progress.

What if crews were aided by an army of weevils? What if instead of applying herbicide, crews could release a miconia-specific fungus that killed seedlings as they sprouted? Perhaps someday butterflies will have replaced the helicopters, their larvae working for a fraction of the cost.

This fairy-tale solution holds more promise than you'd think.

There are places where miconia is not a problem, and Tracy Johnson, Paul Hanson, and Robert Barreto are among the handful of scientists studying the reasons why.

The first step is observing miconia in its natural habitat, and that can be surprisingly difficult. In Costa Rica, where the plant is native, Hanson had such trouble locating it that the University of Costa Rica entomologist thought it was "almost on the verge of extinction, it took such a long time to find."

Brazilian mycology professor Robert Barreto searched for the plant in Brazil and Venezuela and only found isolated, individual plants. "They were always below the canopy and attacked by loads of pathogens and insects." It was these insects and pathogens that the researchers were looking for.

Scientists believe that some species become invasive outside of their native range because they have been released from the natural

"It's like prospecting for gold."
—Robert Barreto

enemies that once held them in check. Andy Sheppard, lead researcher with CSIRO, Australia's national science agency, explained it this way: "Invaders, like miconia, can come in and form monospecific stands. They're not playing by the same rules as the [existing native] species."

By introducing miconia's natural enemies, we could force it to "play by the rules," preventing it from creating the monotypic stands that threaten the rainforest ecosystems of Hawai'i, Tahiti, and Australia.

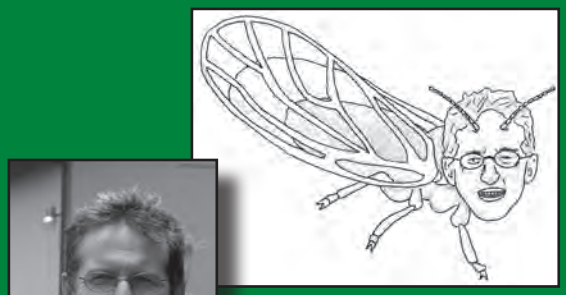
"It's interesting and exciting going into the field looking for [natural enemies]," said Barreto. "It's like prospecting for gold. You get the feeling, 'Oh, I found the right one!' It's very exciting, but that's just the beginning. There's a very long road ahead when you find something that's promising."

Once found, the natural enemy is studied in its native environment to better understand its life cycle and how it keeps miconia in check. Then it's tested in quarantine in Hawai'i to see if it will survive here and to ensure it will not have an impact on other species. Only after thorough testing will an insect or pathogen be released into the environment. Even then, it will be closely monitored to study the impact it has.

"The strategy is variety and in combination," Johnson observed. The silver bullet he is searching for is more of a silver shotgun shell, packed with a plethora of weevils, butterflies, scale insects, and fungi to attack miconia at all stages. Fungi and caterpillars skeletonize leaves, weevils bore out stems, and larvae snack on the flowers and seeds. This assortment of miconia enemies will not eliminate the plant, but "neutralize miconia's threat to Hawaiian forests," said Johnson.

It's a search for solutions fraught with challenges. A weevil that bored out the inside of the miconia stem ended up providing habitat for ants that, in turn, killed the weevil. A leaf-devouring butterfly larvae couldn't be reared in a laboratory. There isn't just one insect or fungus to stop miconia, or if there is, it has yet to be found. Johnson sees the solution coming from a variety of natural enemies working in combination to take down this super-weed. It may be the fungus Barreto is working with, the caterpillar Hanson captures, and a weevil yet to be discovered.

Finding the silver shotgun shell will take time. In the best-case scenario, with increased funding, Johnson said he may have something in five years. Until then, these scientists continue to search. Robert Barreto summed it up perfectly: "I have committed to this project and will use whatever resources available to continue contributing. I've been involved for fourteen years and I don't want it to fail."



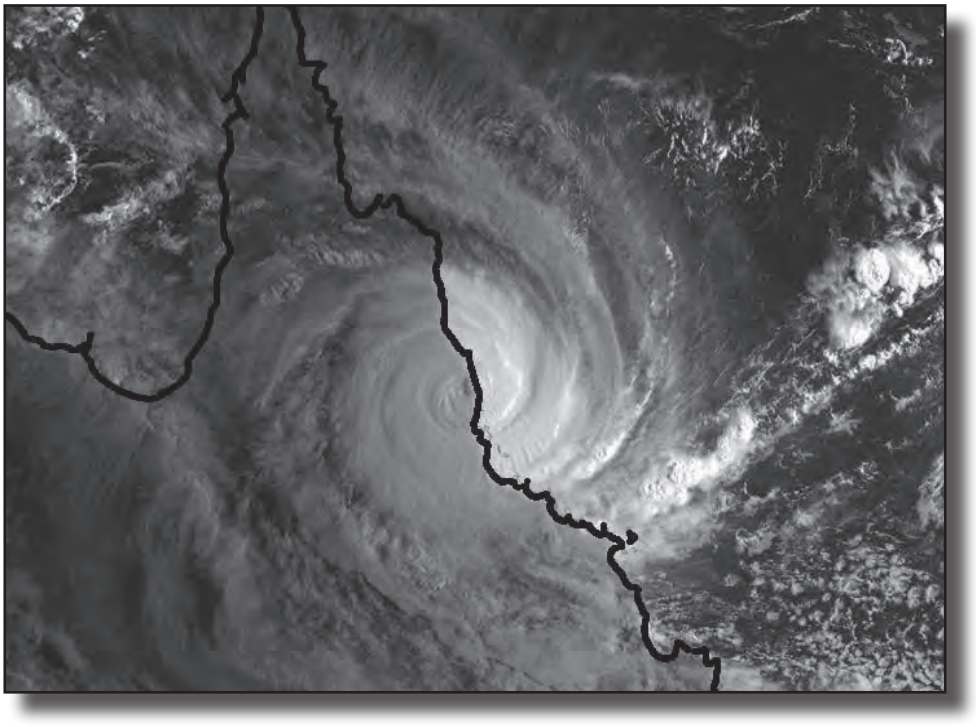
Tracy Johnson is a research entomologist in charge of the biological control research program at the U.S. Forest Service's Institute of Pacific Islands Forestry. He works to find natural methods of controlling strawberry guava, Himalayan raspberry, plume poppy, cane tibouchina, and miconia.

Robert Barreto is a professor of mycology in the Department of Phytopathology of the Universidade Federal de Viçosa in Brazil. He conducts and supervises research on the natureal enemies of weeds native to the neotropics, incluing lantana, strawberry guava, Brazilian pepper tree, and miconia.

Mohsen Ramadan is the exploratory entomologist for the Hawai'i Department of Agriculture, Plant Pest Control Branch. He plans and conducts explorations in foreign countries for the natural enemies of pest species, including the *Erythrina* gall wasp, fireweed, and miconia.

Lessons from Australia

By Helen Murphy, Ph.D.
Research Scientist
Australian Commonwealth Scientific and Industrial Research Organization



Helen Murphy from CSIRO and Simon Brooks from Biosecurity Queensland are closely monitoring a miconia population's response after a severe cyclone caused extensive damage over the infestation area in 2006. The research shows rapid growth and establishment rates following the cyclone, due to the very high light levels from the severely damaged canopy.

Miconia calvescens was first introduced to Australia in 1963, as seed from the Peridenya Botanic Gardens in Sri Lanka. The Townsville Botanic Gardens cultivated the seed and the species was subsequently spread by plant nurseries and accidental escape throughout the region. Three large and several small infestations now exist, spread across the Wet Tropics World Heritage Area in north Queensland. The large infestations range from 100 to 470 acres (40 – 190 hectares) and the small are less than 12 acres (5 hectares).

Experience in the Pacific suggests that, should miconia become widely established in Australia's rainforests, it would have severe impacts on the plant communities of the Wet Tropics leading to a decrease in World Heritage values and potentially additional economic costs. *Miconia calvescens* (as well as *M. nervosa*, *M. racemosa* and *Clidemia hirta*) has the highest legislative priority for management in Queensland. Since 2001 it has been the target of a nationally cost-shared eradication initiative.

The following is a summary of presentations by Australian researchers and weed managers at the 2009 International Miconia Conference.

Search and eradication efforts in the rainforest habitats in which miconia occurs in Australia are severely hampered by difficult terrain, dense vegetation, and infeasibility of vehicle access. Researchers from Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), including Cameron Fletcher and David Westcott, have developed new technologies in the form of invasion

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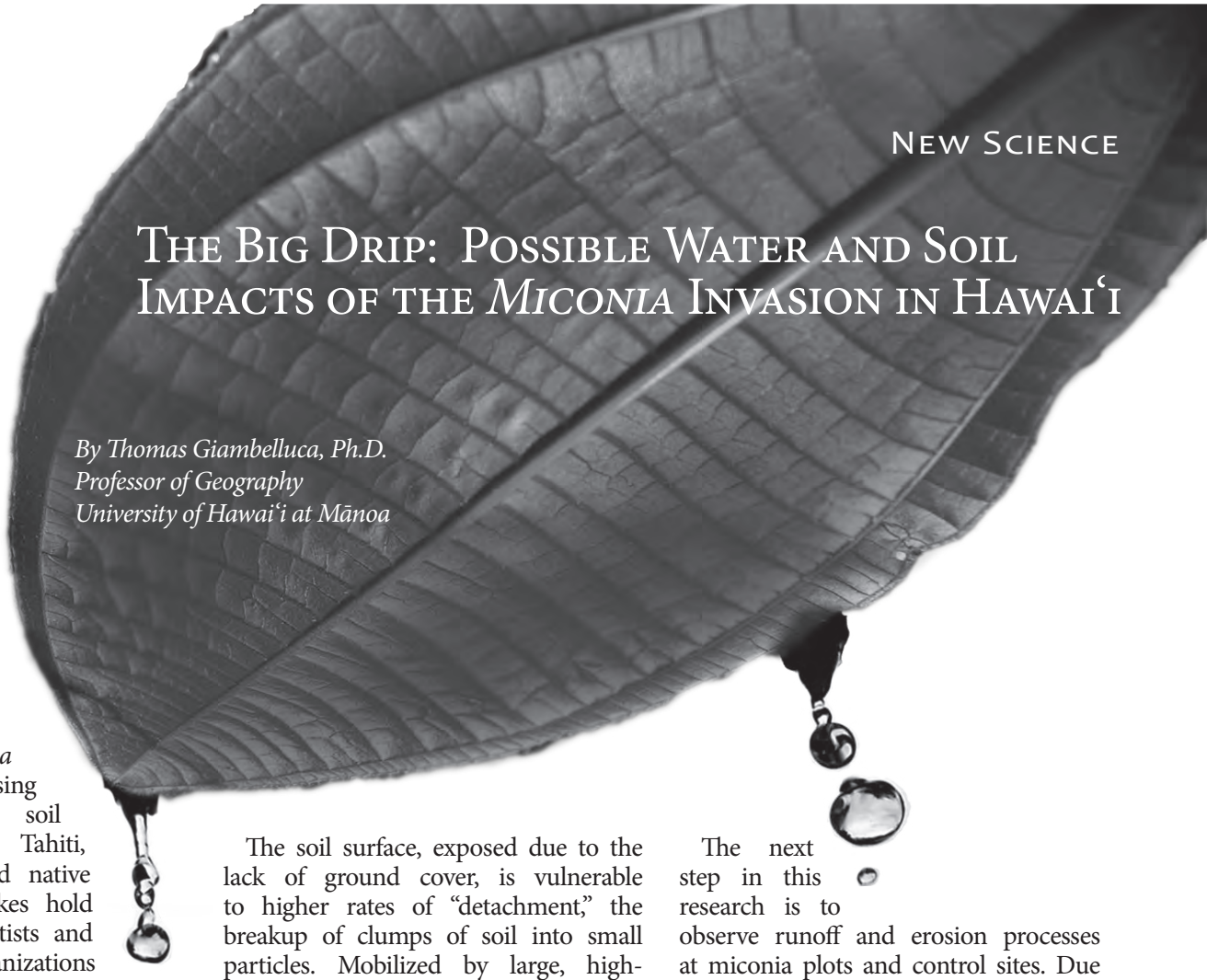
The Big Drip: Possible Water and Soil Impacts of the *Miconia* Invasion in Hawai'i

By Thomas Giambelluca, Ph.D.
Professor of Geography
University of Hawai'i at Mānoa



Anecdotal evidence suggests that, besides impacting biodiversity, the invasive tree *Miconia calvescens* is causing landslides and other soil erosion problems in Tahiti, where it has displaced native forest. As miconia takes hold in Hawai'i, local scientists and environmental organizations have voiced concerns about its potential hydrological impacts: increased flooding, diminished groundwater supply, loss of topsoil, and siltation of coral reefs.

Miconia invasions lead to dense, monotypic stands with little or no ground-covering vegetation. Miconia's large, dark leaves reduce light levels beneath the canopy, thereby inhibiting the germination and growth of other plant species. Large leaves also produce relatively large throughfall drops during and after rain events.

"Throughfall" refers to rainwater that reaches the forest floor. Some throughfall consists of raindrops that fall through the forest canopy without hitting any leaves or branches. The rest comes from drops that splash or drip from wetted vegetation. Water that drips from the leaves of tree canopies can be much larger than raindrops. If falling from a great enough height, these large drops can reach kinetic energy levels that exceed that of natural rainfall in open areas. Because these large drops hit the ground with greater force, they can result in greater impacts to the soil.

The soil surface, exposed due to the lack of ground cover, is vulnerable to higher rates of "detachment," the breakup of clumps of soil into small particles. Mobilized by large, high-energy throughfall drops, these particles can clog soil pores and reduce rates of infiltration. This leads to overland flow during rainfall events, a process unlikely to occur on undisturbed soils of native forests on Pacific Islands.

In a pilot study funded by the U.S. Fish and Wildlife Service we were able to verify that light levels under miconia stands in Onomea on Hawai'i Island are very low.* Based on a limited survey, we also observed ground cover to be very sparse under miconia, with very little live vegetation and meager leaf litter. Most studies have shown that runoff and soil erosion become severe as ground cover declines below fifty percent, as was the case for the Onomea miconia stands.

Using laser disdrometers, Japanese researcher Dr. Kazuki Nanko helped us measure the size and velocity of throughfall drops under miconia and other tree canopies at Onomea and nearby field sites. Dr. Nanko found that miconia produced throughfall drops up to seven millimeters in diameter, much larger than typical two-millimeter diameter rainfall drops and significantly larger than throughfall drops under native trees.

The next step in this research is to observe runoff and erosion processes at miconia plots and control sites. Due in part to the effectiveness of miconia eradication efforts in Hawai'i, we have not been able to find stands large enough and in proximity to appropriate control sites to do the research in Hawai'i. It is therefore likely that further study of hydrological impacts of miconia will be based in French Polynesia, where the miconia invasion is much more advanced.

Thus far, our studies indicate that in areas invaded by miconia, the effects of sparse ground cover, high-impact throughfall, and overland flow could combine to produce excessively high rates of soil erosion. Accelerated soil erosion removes topsoil, depriving native plants of access to nutrients and water and leading to siltation of streams and the near-shore marine environment.

Thomas Giambelluca is a professor at the University of Hawai'i at Mānoa, where he has been conducting research on the climate and hydrology of Hawai'i and other tropical areas for nearly 30 years.

**Dr. Ross Sutherland, professor and chair of the Geography Department at the University of Hawai'i (UHM); Ryan Mudd, UHM graduate assistant; and Dr. Alan Ziegler, Singapore National University, contributed to this study.*

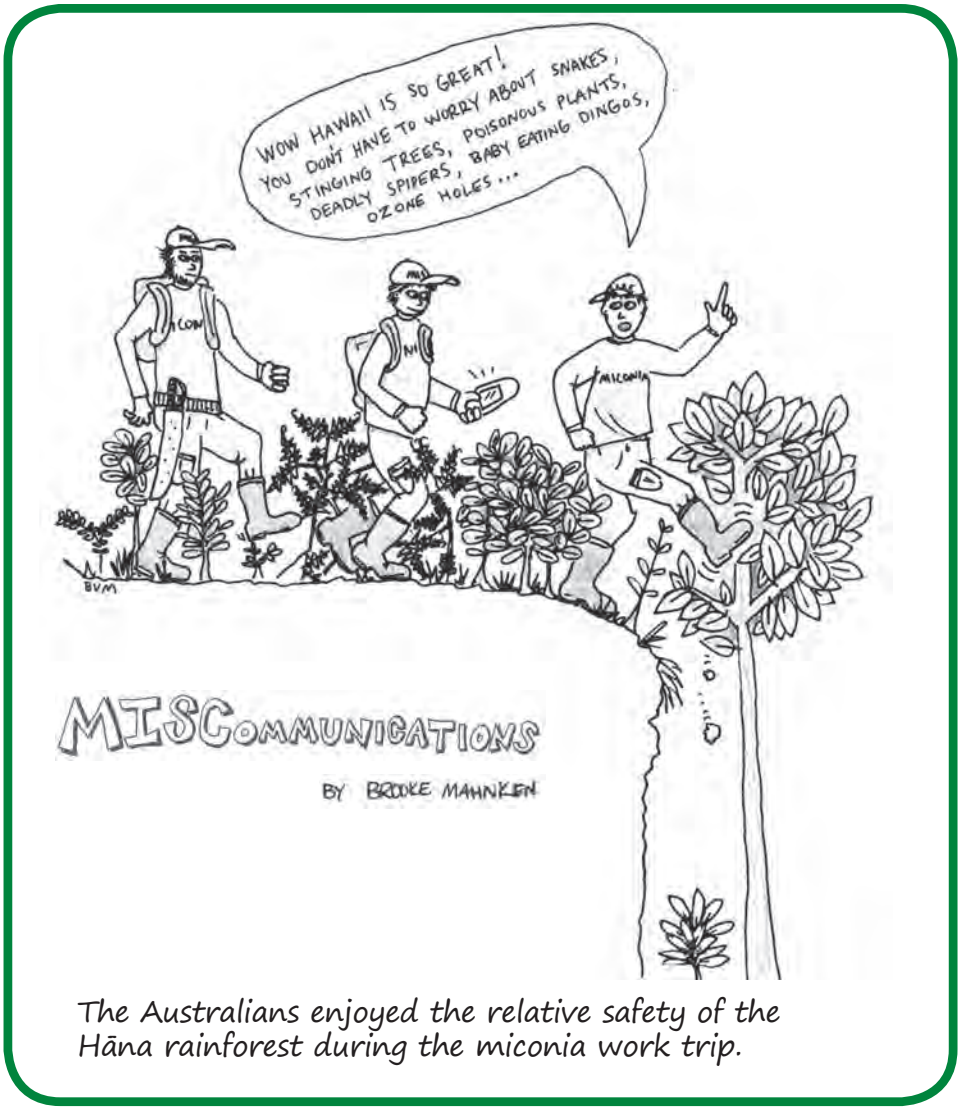
They came from Down Under...

Some of the Australian presenters

Susie Hester

Denise Hardesty

Cameron Fletcher



The Australians enjoyed the relative safety of the Hāna rainforest during the miconia work trip.

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simulation models, underpinned by extensive research on tropical seed dispersal pathways to predict the rate and spread of miconia. Work in this area has already impacted the way miconia is managed at a strategic level in the Australian rainforest.

Denise Hardesty and colleagues from CSIRO have recently embarked upon a genetic comparison of miconia populations within Australia to better understand dispersal pathways both at the regional scale and within an infestation site. They are also comparing the Australian populations with those found in Hawai'i and Tahiti. Results to date have shown that while genetic diversity in miconia is relatively low within individual populations across Australia, the genetic signatures between populations are consistent with the idea that multiple introductions have taken place. It is also of note that genetic diversity levels in Australia are similar to that observed in Pacific Island populations where miconia has been present for a much longer period.

Research by Susan Hester from the University of New England tackles practical issues related to the economics of managing miconia infestations through a simulation model. The stage matrix is the first known attempt at describing how a miconia population might develop through time under Australian conditions. The model has been used to predict the time and costs to eradicate miconia in the Wet Tropics of Australia for different levels of search effort.

Helen Murphy is a research scientist at CSIRO in Atherton, North Queensland. Helen leads a large project monitoring miconia and other invasive species and predicting the pattern of spread. An emerging focus is on the impact of climate change on the distribution of weed species in the tropics.

A hui hou, MISC Chairperson Randy Bartlett

By Shannon Wianecki
MISC Newsletter Editor

Randy "Ranbar" Bartlett earlier in his tenure as MISC's chair.

The Maui Invasive Species Committee marks the end of an era as Randy Bartlett, its first chairperson, passes on the torch.

Without Bartlett's unflappable commitment, there might not have been a MISC. He helped steer the fledgling organization from its inception—a rowdy meeting of somewhat like-minded conservationists held on Pineapple Hill in August of 1997.

Randy had been instrumental in establishing and leading the Melastome Action Committee over the previous six plus years. For nearly two decades following that first meeting, which resulted in the creation of the Melastome Action Committee, Bartlett has lent his *mana'o* and muscle to the fight against invasive species. "Randy was instrumental in converting the Melastome Action Committee to MISC," says MISC Manager Teya Penniman. "MISC developed under his leadership."

Bartlett's insight into the local political scene, large network of friends, and reputation in the community were significant assets to MISC in its early days. His involvement lent the nascent organization much-needed credibility.

Bartlett assisted MISC as it outgrew its first headquarters, expanded its reach to Lāna'i and Moloka'i, added personnel and field crews, and aggressively pursued one invasive pest after the next. Under his watch, what started as a response to a very tenacious rainforest weed became an unprecedented model for fighting invasive species referenced around the world.

Bartlett traveled to O'ahu to speak before the State Legislature on invasive species issues and attend Coordinating Group on Alien Pest Species meetings. He credits his former employer for supporting his voluntary involvement.

"It was fortunate that Maui Land and Pine gave me the flexibility to be an advocate for invasive species control at the state level. We proved that the ISCs are a working model… there was a gap that needed to be filled."

Bartlett began his lifelong career in conservation as a summer volunteer at Haleakalā National Park in 1985, moving on to supervise the Pu'u Kukui Preserve for Maui Land and Pineapple. In addition to chairing MISC, he has served on a variety of boards, including the Friends of Moku'ula and the Hawaiian Conservation Council. He is an avid nature photographer, stand-up paddler, and long-distance swimmer. But above all, he's a passionate defender of native Hawaiian ecosystems.

"Everyone involved has made MISC what it is," says Barlett. "It takes everyone's effort and involvement. I will look forward to continuing to be part of it. MISC is a great organization. It has been my pleasure."

"More than 2.2 million miconia plants have been destroyed by schoolchildren, local conservation groups, religious groups, and the French Army."

"French Polynesia" continued from page 5

and the University of Hawai'i. A plant fungal pathogen discovered in Brazil is causing leaf disease and killing seedlings (up to seventy-percent mortality rate in laboratory conditions), and has proven to be highly host-specific. It was first released on Tahiti in 2000, on Raiatea in 2004, and on Nuku Hiva in 2007.

Post-release monitoring surveys indicate that this biocontrol agent is more efficient at higher elevations and in cooler climates (above 2,000 feet / 600 meters). It causes a partial defoliation of miconia trees—up to forty-five percent. This allows more light in the understory for native plants to grow, flower, set seed, and recruit. Rare and threatened endemic plants are slowly recovering under the dense monospecific stands of miconia that are now heavily attacked by the pathogen.

Complete miconia eradication is being attempted on the islands of Fatu Hiva and Nuku Hiva in the Marquesas, where a few reproductive trees were found in the 1990s. But this will be a long-term effort, since miconia seeds can last more than sixteen years in the soil.

Two additional successes of miconia management in French Polynesia have been public education and prevention: the species has not been found in any of the other dozen high volcanic islands of the Society, Australs, and Marquesas during the last twenty years.

The miconia research and management program is a long saga with scientific questions, searches and discoveries, fighting strategies and tactics, hopes, disappointments and sometimes doubts, but is above all buoyed by people dedicated to the same goal: the preservation of a unique island biota.

Jean-Yves Meyer is a research scientist with the French Polynesia Government's Délégation à la Recherche. He has been involved with miconia studies and control since 1992, and acts as an expert consultant on biological invasion initiatives throughout the Pacific and Indian Oceans.

MISCommunications

Did we mention the catering was ono?

Mahalo to all who gathered to make the 2009 International Miconia Conference a Success

Attendees of the 2009 International Miconia Conference

Award Recipients

Kuhea Paracuelles accepted the Ka Pouhana *Leadership award for Maui County's early and sustained support of MISC, with* Ka Pouhana *meaning the main post of a structure on which others depend.*

Betsy Gagné accepted the Kuleana Mauka-Makai *award on behalf of the Department of Land and Natural Resources, recognizing the agency's help in protecting both the forested watersheds and downstream coral reefs from miconia.*

The He Aliʻi Ka Manu *Vision award went to Haleakalā National Park, accepted by Steve Anderson, for seeing the threats that exist outside park boundaries and partnering to protect the native habitats within.*

MISC Members & Staff

Committee Members
Chair: Pat Bily, The Nature Conservancy
Vice-Chair: Fern Duvall, Ph.D., Hawaiʻi DLNR
Steve Anderson, NPS-Haleakalā National Park
Randy Bartlett, Chair Emeritus
Pat Chee, Hawai'i Invasive Species Council
Daniel Clark, U.S. Fish and Wildlife Service
Stuart Funke d'Egnuff, Tri-Isle RC&D
Jeremy Gooding, NPS-PIEPMT
Bob Hobdy, Community Member
Lloyd Loope, Ph.D., United States Geological Survey
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Kamalani Pali

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