



# VECTOR VISION™

## Full-Scale Assault Now Under Way as Key West District Battles Dengue

Swarms of them come from near and far, creating a furor in Key West, Florida.

“They” are not mosquitoes. They are representatives of the national and international news media, who journey to the southernmost tip of the continental United States to cover a story about the first dengue fever outbreak in Florida since the 1930s.

The dengue outbreak has captured the attention of traditional journalists and a host of bloggers. A Google search of “Dengue fever Key West” produced 793,000 results. Employees of the Florida Keys Mosquito Control District have been pictured in *The New York Times* and followed by producers and photographers from CNN, Fox News and reporters from many other news outlets.

But behind the scenes, District Superintendent Mike Spoto and Deputy Director Andrea Leal are mounting a multi-pronged assault on *Aedes aegypti* and the habitat where the vector thrives.

### Small City, Many Visitors

Key West is a major Florida tourist destination, with hundreds of thousands of visitors each year, and is a popular port of call for cruise ships from all over South America. But the 12-square-mile city itself has only about 11,000 households and a population of less than 26,000. The dengue outbreak has been



A representative of the Florida Keys Mosquito Control District delivers a dengue fever information package to a Key West resident.

centered in the Old Town section of the city, which makes up about half the total land area.

“The people of Key West are pretty laid back,” Spoto explained. “Many homes don’t have screens, and people often leave their houses wide open, so they are very much at risk of being bitten by infected mosquitoes.” Complicating the situation is the “enormous amount of fresh water” found in the many open wells and cisterns in the area, Spoto said.

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## Long-Term Project Seeks To Build Guidelines for Area-Wide Asian Tiger Mosquito Control

A long-term project to determine the best methods of controlling *Aedes albopictus*, the Asian tiger mosquito, is in the third of at least five years of intensive study, combining work by staff at Rutgers University's Center for Vector Biology with field efforts by Mercer and Monmouth county mosquito control districts in New Jersey.

The project – titled “Area-Wide Management of the Asian Tiger Mosquito” – is funded through a cooperative agreement from the U.S. Department of Agriculture, according to Dr. Dina Fonseca, a Rutgers researcher who is serving as principal investigator.

“Our objective is to establish a set of operational guidelines that will enable control of the Asian tiger mosquito over a large area, beyond a single township or community,” Fonseca explained. “We are working closely with Dr. Gary Clark of the USDA's Agricultural Research Service. The concept has been tested under similar USDA programs with plant pests such as leafy spurge. But this is the first area-wide project on mosquitoes.”

### “Most Annoying Mosquito”

Fonseca said the project is designed to test the efficacy and economics of public education, source reduction, and a variety of insecticide application techniques. The project target, *Ae. albopictus*, is a recent arrival in New Jersey, Fonseca said.

“The Asian tiger mosquito was detected here in 1995, but populations have exploded in the past five years,” she said. “While it can be a vector of diseases, such as dengue fever and chikungunya virus and even West Nile virus, in most of our situations it's a nuisance pest. It's a relentless, day-biting mosquito, and it literally prevents people from being outdoors in their gardens and yards. It has become our most annoying mosquito.”

The mosquito's larval habitats make control challenging. The pest will lay eggs above water that collects in any small container, from bottle caps to children's toys, and tree holes. And in warm conditions, the time span from egg to larva to flying adult can be as brief as seven days.



An employee with Mercer County Mosquito Control uses a backpack sprayer to apply larvicide to a favorite habitat of *Aedes albopictus* – discarded tires.

There is good news for the people of New Jersey, however. The state has 21 mosquito control programs, most of which were formed to deal with salt marsh mosquitoes that inhabit the Atlantic coast. The districts have been in business for many decades, so the staffs have the experience and equipment to implement a full range of control techniques.

### Multi-Year Project

Fonseca and her cooperators initiated the area-wide project in 2008. The objective was first to identify groups of 1,000 homes (a site) in each county with similar characteristics so they could be used as comparisons. They initially identified a dozen or so potential sites, then narrowed that group to three in each county through intensive surveillance throughout the active season. They also characterized each site for the residents' socioeconomic and education levels.

In 2009, the project moved to conducting control in the field. In each county, one site was the control, with no project-specific mosquito control measures planned against *Ae. albopictus*. In the second site, residents and schoolchildren were educated and encouraged to reduce mosquito populations in their own backyards. The third site included full intervention, with various integrated pest management approaches undertaken to control the Asian tiger mosquito, as well as education efforts.

Ary Farajollahi, superintendent of Mercer County Mosquito Control, and Sean Healy, entomologist in Monmouth County, are in charge of the project's mosquito control interventions.

### Education Tested, Enhanced

In 2009, the education efforts focused on elementary schools serving children who live in the study sites. Working with a curriculum developed by Rutgers faculty, teachers were trained and children were engaged to learn about mosquito biology and source reduction. A door-to-door brochure distribution campaign also was implemented, a standard technique.

But the education investment fell short when it came to immediate results. "In 20 years, those students will probably be very aware of mosquito control, but the work didn't translate into actual reductions now," Fonseca said.

"Instead, in 2010, the education efforts relied more on 'active' teaching," she explained. "For example, a group of AmeriCorps volunteers worked side-by-side with Drs. Kristen Bartlett-Healy and George Hamilton, going door-to-door engaging the residents, providing information, examples, and guidance regarding source reduction. The preliminary results so far are encouraging."

### IPM Tactics Evaluated

Similarly in 2009, Farajollahi's and Healy's staffs also tested an ambitious door-to-door inspection program in both Mercer and Monmouth counties.

"We went through every single home in the IPM site," Farajollahi related. "We distributed educational material, we removed trash and debris where water collected. We also treated with larvicides where containers couldn't be removed or emptied. Our last resource intervention was to use adulticides when Asian tiger mosquito populations exceeded our minimum threshold."

But, in the end, door-to-door intervention "just wasn't cost-effective," Farajollahi said.

In 2010, Farajollahi and Healy made a number of adjustments based on their project sites and previous experience.

In more densely populated Mercer County, Farajollahi's crews did a single round of door-to-door inspections early in the season to get an "ant's view" of the location and identify potential Asian tiger mosquito hot spots. Larvicides were applied with hand and backpack sprayers. When trap counts showed a mean of five adults per location, trucks equipped with ULV sprayers delivered adulticides.

Healy's work in more suburban Monmouth County has been similar, but the lot size for each of the 1,000 homes is larger, so he has a much greater area to cover. That makes the work with truck-mounted sprayers especially important. Both mosquito control programs are evaluating a number of novel larvicide application approaches to deal with their unique situations.

Adulticide applications provide only temporary relief against Asian tiger mosquitoes, so both counties are intensely evaluating an efficient and efficacious method of delivering a larvicide to container habitats. One such technique has been the application of VectoBac® WDG using truck-mounted and backpack sprayers within the treatment sites. The hope of the researchers is to quickly deliver a potent larvicide to larval habitats that are cryptic, numerous and mostly inaccessible.

### Expansion in 2011

Fonseca said the trials will expand to the countywide level in 2011, and more experimentation will take place.

"We are starting to understand how the approaches to controlling the Asian tiger mosquito must be customized, just based on our experience in our trial sites samples," she said. "For our guidelines

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**Monmouth and Mercer mosquito control staff experimented with truck-mounted sprayers to deliver larvicides, such as VectoBac® WDG, to container habitats in large treatment sites that are difficult to access.**

## Biological Control of Mosquitoes and Biting Flies Improves Quality of Life for First Nations Community

Many remote Aboriginal communities in Canada have few amenities, but with the recent settlement of land claims and the management of Native-owned natural resources, some First Nations are enjoying improved employment opportunities, healthcare and education.

They also are making significant improvements to their environmental health, in part by regaining access to their natural environment through a black fly and mosquito control program featuring VectoBac® biological larvicides.

One example is Nemaska Nation, a 600-person community comprising of Cree families who originally lived near the old Hudson Bay fur trading post along Lake Nemiscau. Still located within their ancestral grounds, their new village is on the shores of Lake Champion, about 1,000 kilometers north of Montreal. As the seat of the Grand Council of the Crees and Cree Regional



**A Diamond Sylvico sign indicates that the First Nations community of Nemaska, Quebec, is being protected from black flies and mosquitoes by a biological larvicide.**

Authority, Nemaska is very important to the nearly 15,000 Cree living in northwestern Quebec.

Nemaska is in the heart of the Baie James region, which is benefiting from the development of the world's largest hydroelectric project. The project has resulted in the construction of a road network from Montreal to the area, as well as throughout the region. In addition to the influx of construction workers and managers arriving in the area, there are nine First Nations/Cree communities in the region that are intimately involved in the construction and management of this complex.

### Initial Control Program

To improve the working environment for project construction workers, Quebec company Diamond Sylvico, with assistance of GDG Environment of Trois Rivieres, was hired to conduct a mosquito and black fly control program at residential camps located in the area. In 2009, Diamond Sylvico, a subsidiary of GDG Environment Group, initiated a mosquito and biting fly control program for Nemaska.

The demonstration program was considered a success, achieving a significant reduction in the number of black flies and mosquitoes in the area. "The biting fly control program has definitely improved the quality of life for the community," said Nemaska Chief Josie Jimiken. "The use of a biological insecticide, like VectoBac®, has no negative effects on the local environment, which is equally important to the Cree."

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### In Remote Locations, Many First Nations Members Deal with Biting Flies, Mosquitoes

Nearly one million residents of Canada claim full or partial First Nations heritage. Many of the larger Native communities are located in or near major urban centers such as Montreal, Toronto, Winnipeg, Saskatoon and Vancouver. However, there are more than 600 other First Nations communities spread across Canada, mostly in the northern regions and in many remote locations.

Many of these communities are small, isolated villages, composed of several hundred residents. Since they often are situated on a lake or a river, these locations tend to be ideal habitats for mosquitoes and black flies. To date, few communities have been able to invest in mosquito or biting fly control programs, but with recent settlement of land claims and the management of Native-owned natural resources, that is beginning to change.

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With the insect pests controlled, the chief explained that young children and elders are more active and can spend time outdoors. Increased levels of outdoor physical activities – playing, walking, visiting neighbors – are vitally important to the Cree Nation due to the increasingly high levels of diabetes in these remote communities. Now Nemaska residents can truly

enjoy their outdoor environment without the constant barrage by mosquitoes and black flies.

One of the key champions of the Nemaska project was Chief Billy Diamond, who died September 30, 2010. Rejean Bergevin says Diamond Sylvico will remain committed to building on the success of the Nemaska project by providing relief to other First Nations communities across Canada, especially in memory of his late partner.

## Key West District Battles Dengue

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### Integrated Approach

To fight the dengue outbreak, the Florida Keys district is employing every appropriate tool in its arsenal in an integrated approach to combat the vector mosquitoes.

Along with a major investment in surveillance and public education, a key element of the district's *Ae. aegypti* program is its domestic inspection effort. With a staff of 88 and as many as 35 part-time employees, the district's inspectors go door-to-door to identify water-holding containers where the mosquitoes breed. Those include everything from refuse piles to the region's ubiquitous bromeliad plants.

"Most people have been very cooperative about allowing us access to their properties," Spoto added. "A few have balked, but since we have a public health advisory in place, we've been able to gain access even in cases where the residents have been reluctant."

During their residential calls, district staff empty as much water as they can and then use backpack sprayers to treat other larval sources. Swamps, mangroves and low-lying areas near the city also are treated with larvicides.

Also to combat the *Ae. aegypti* mosquitoes, more than 5,300 lethal ovitraps have been employed around the city. And, with four helicopters and two fixed-wing aircraft, the Florida Keys district conducts significant adulticiding operations as surveillance indicates a need.

Spoto and Leal also said they are adjusting the product mix when necessary to avoid development of resistance and are experimenting with new approaches.

"This is a year-round effort for us because of our subtropical climate, so we are constantly seeking ways to improve our program in the interests of public health," Spoto said.

### Dengue Fever: World's Most Common Vector-Borne Viral Disease

Dengue is the most common vector-borne viral disease in the world, causing an estimated 50–100 million infections and 25,000 deaths each year, according to the U.S. Centers for Disease Control and Prevention (CDC).

During 1946–1980, no cases of dengue acquired in the continental United States were reported. Since 1980, a few locally acquired U.S. cases have been confirmed along the Texas-Mexico border, temporally associated with large outbreaks in neighboring Mexican cities.

On September 1, 2009, a New York physician notified the Monroe County, Florida, Health Department and the Florida Department of Health of a suspected dengue case in a New York state resident whose only recent travel was to Key West, Florida.

CDC confirmed the diagnosis, and a press release was issued to notify the public and Key West physicians of the potential risk for locally acquired dengue infections. In the next two weeks, two dengue infections in Key West residents without recent travel were reported and confirmed.

By mid-August 2010, more than 50 cases of dengue had been confirmed during the last two years.

## Valent BioSciences Achieves ISO 9001:2008 Registration

Valent BioSciences Corporation, the worldwide leader in the development and commercialization of biorational products for agriculture and public health, has achieved ISO 9001:2008 registration of its U.S. operations.

Valent BioSciences serves customers in more than 90 countries. Its low-risk, environmentally compatible products include key brands such as VectoBac®, VectoLex®, VectoMax® and Teknar® biological larvicides for mosquito control programs.

**ISO 9001:2008** is one in a family of standards for quality management systems maintained by the International Standards Organization. Some of the requirements of ISO 9001:2008 include:

- a set of procedures that cover all key processes in the business;
- monitoring of the processes to ensure they are effective;
- keeping adequate records;
- checking output for defects, with appropriate and corrective action where necessary;
- regularly reviewing individual processes and the quality system itself for effectiveness;
- facilitating continual improvement.

“Earning ISO 9001:2008 registration illustrates to customers worldwide our strong commitment to quality at all levels of our organization,” said Mike Donaldson, president and CEO of the company. “Customers want to be confident that they are doing business with an organization that can meet or exceed their needs in a timely manner. Successfully completing the rigorous process required for certification demonstrates that we are continually improving our quality management systems.”

Donaldson added: “As a company specializing in biorational products, the quality in the fermentation, downstream processing and formulating has been paramount to the sustainability and success of the company. In the future, the Quality Management System will help to continually improve on the products and services we provide to our customers.”

## Asian Tiger Mosquito Control

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**A Monmouth County mosquito control staffer checks a bioassay container to determine whether an Asian tiger mosquito treatment was effective.**

to be useful on a regional or even statewide basis, there are many variables that will need careful consideration.”

One project component that will help is the economic analysis being performed by Don Shepard of Brandeis University. He is calculating costs for the various interventions, so districts will have a range for the investment each requires.

Shepard also is conducting mail and telephone surveys to ascertain how much citizens believe they currently pay for mosquito control; how much they value the service; and how much they spend on personal protection against the pests, including items such as backyard insecticides, citronella candles and other home remedies.

“At a time when our society is dealing with core issues, such as obesity, and we’re encouraging people to spend more time outside, pests such as the Asian tiger mosquito can have a negative effect on quality of life,” Fonseca said. “Our area-wide research project is designed to provide practical, adaptable guidelines that mosquito control districts can use to combat this pest.”

## Begin Legislative Dialogue on NPDES Permits Now, Mosquito Control Districts Urged

Bills introduced in both houses of Congress offer a glimmer of hope that mosquito control districts, along with other affected end-user groups, might avoid the long-term adverse impacts of the proposed NPDES permitting requirements.

But districts should become engaged as soon as possible in an ongoing dialogue with their representatives to help that happen, according to an American Mosquito Control Association official.

The two companion bills – one in the House, one in the Senate – aim to clarify that additional permits are not required for pesticide applications made fully in accordance with the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), said Joe Conlon, AMCA technical advisor.

“The bills specifically mention the concerns of the agriculture and forestry industries regarding pesticide applications being affected by the redundant and burdensome regulatory overlay to FIFRA that the NPDES permitting system would impose,” Conlon said. “But the legislation would have a profoundly positive impact on mosquito control as well.”

It’s unlikely that the bills will get much traction until after the mid-term elections in November, Conlon noted, and probably



not until after the final version of the NPDES general permit is revealed late in 2010 and its untoward effects are felt by the general populace.

“But it’s time to start planting the seed with federal lawmakers that this new permitting requirement will have very negative consequences for our members, who are charged with protecting the public’s health,” Conlon said. “It will be very important for legislators and their staffs to understand the implications by the time we have our Washington legislative days in early May 2011.”

### Wanted: Article Ideas about Novel Control Approaches

*Vector Vision* is searching for a few good ideas – and what better place to seek them than among our readers.

Has your district implemented a new mosquito control technique? Have you adapted equipment to your unique situation? Or have you created an effective program to generate and sustain support for your district and its special role in public health?

Simply send a brief description of your article idea (along with the best time and method to contact you) to [editor@vectorvision.com](mailto:editor@vectorvision.com). We’ll follow up with you and determine whether the story is a good fit for the newsletter.

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