



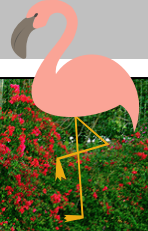
# Integrated Pest Management at Parrot Jungle Island



Parrot Jungle Island is a zoological theme park near Miami, Florida. Although the park is well known for the collection of tropical birds and animals exhibited throughout its 18-acre premises, few people are familiar with its excellent work in integrated pest management.

## Background on Parrot Jungle Island

Parrot Jungle Island (PJI) was created in the 1930s to exhibit tropical birds and animals. In 2002, PJI closed down while the entire facility was redesigned and rebuilt from the ground up. The park reopened in June 2003. Now its birds continue to dazzle visitors, flying through gardens that have also received acclaim. Home to 2,000 varieties of plants and flowers, the tropical gardens are well known for their rare plants and high horticultural standards.



## The Horticulture Program

Through the Pesticide Environmental Stewardship Program (PESP) funded by the U.S. Environmental Protection Agency (EPA), Jeff Shimonski, Director of Horticulture at PJI, was awarded funding for an Integrated Pest Management (IPM) project designed to reduce the use of conventional chemical pesticides.

In the early years of the park, large amounts of pesticides were used to control mosquitoes. This practice was toxic to the bromeliads, spurring Jeff to seek other mosquito control options.

Jeff was able to use PESP funding received in 2005 to identify areas inside the park where mosquitoes were breeding, find out which species were present out of the 45 different mosquito species in south Florida, and test various biochemicals or compounds that were benign to the environment and not toxic to the plants. He knew it was important to understand the mosquito species in order to control them.

The results have proven successful. Aerial adulticiding was stopped at the end of August 2005, after years of spraying the park at least once a day, nearly every day, regardless of the season or the amount of local rainfall. This includes 2006 when there was record rainfall at PJI.

Now, thanks to Jeff Shimonski, PJI controls and eradicates mosquito larvae that breed onsite using sampling and larviciding in an IPM program.

## What is IPM?



Integrated Pest Management (IPM), as it relates to mosquito control, is an effective and environmentally sensitive approach to managing mosquitoes.

IPM mosquito control is a program of common sense practices based on current, comprehensive information on the life cycles of mosquitoes and the interaction of mosquitoes with the environment.

An IPM program may take advantage of various pest management options, including source reduction, mosquito habitat modification, and the use of biochemical pesticide products to control larval and/or adult mosquitoes.



△ *Aechmea mariae-reginae*: A bromeliad at PJI that has *phytotelmata* that can breed mosquitoes.



△ *Cestrum elegans*



△ *Aechmea gamosepala*

Mosquito control decisions should be based upon a monitoring program that includes habitat inspections and a rigorous sanitation program.



For more information you can visit <http://www.tropicaldesigns.com/>



# Integrated Pest Management at Parrot Jungle Island



## Jeff's Story: Finding an Appropriate IPM Strategy

### The process, in Jeff's own words

"The initial premise was to control the larvae that were breeding in the natural water bodies (phytotelmata) found in the thousands of bromeliads that were grown as ornamental plants throughout the 18-acre site of Parrot Jungle Island. I sampled larvae on a weekly basis, identified the species, and tested six biochemical pesticides in an attempt to control or eradicate the larvae without harming the bromeliads or other plants or animals."

### May 2005: Sampling and larviciding of bromeliads begin

"In spring 2005, I started the sampling program once a week on a certain number of bromeliad beds. I had three interns assisting me with the sampling. The species of mosquito larvae that we were commonly finding in the park were *Culex quinquefasciatus* and *Aedes aegypti*, both exotic species. The only native we found regularly was *Wyeomyia vanduzeei*. At this point, we (PJI employees) were fogging the park on a daily basis for mosquitoes."

### June 2005: Storm drain sampling and larviciding begin

"Within a month, I began to realize that bromeliads were possibly only a minor contributor to our mosquito problem. Since Miami-Dade County requires rain water to be maintained on the property where it falls, we had installed about 20 storm drains within the park boundaries during the initial construction. Inside these drains are 80-90 square surface feet of water, depending on if it is a storm drain or a well and vault. I devised a method to sample the water inside and found that certain drains had literally thousands of larvae inside them. These were placed on a sampling schedule of once a week. Any larvae identification issues were resolved with the assistance of Dr. George O'Meara. I then began to treat and document the bromeliads and storm drains with the selected biochemicals."

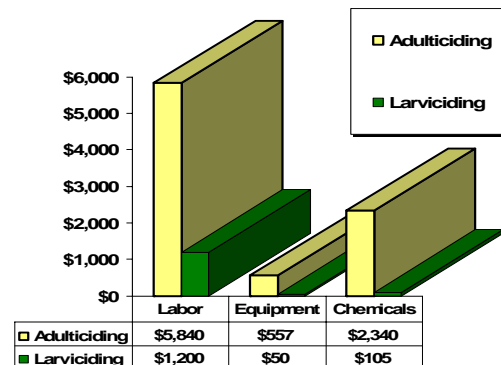
"A small number of the storm drains had been initially treated for larvae control and then for months afterwards, mosquito larvae were either never collected from the drains again or were too few in number to bother. Occasionally, tadpoles or damselfly larvae would be spotted inside the drains while sampling but never in large enough quantities to control the mosquito larvae."

"Other areas within the park also produced larvae: roof tops, rain gutters, the island that our flamingos used for nesting, and animal water containers. These other breeding areas were addressed and removed as possible breeding sites."

**"Since September 2005 it has not been necessary to fog the park for mosquitoes."**

Jeff Shimonski, Director of Horticulture  
Parrot Jungle Island

### Cost of mosquito control at PJI



PJI has saved \$7,382 annually on labor, equipment, and chemicals by switching from adulticide to larvicide.

### Bromeliads + mosquito larvae control: A difficult equation

"Bromeliads, as do many other species of plants, have structures that hold water. These are called phytotelmata and are often important to the plant for providing water and nutrients. Since PJI has a bromeliad collection that numbers in the thousands of plants, I thought to begin there. The problem in the past has been phytotoxicity of larvicides. I had burned many bromeliads a number of years ago testing larvicidal products. I had also noticed that the *Bacillus thuringiensis israeliensis* (Bti) product that we sometimes used didn't always seem to work. I decided to test as many different genera and species of bromeliads as possible."



Jeff samples a storm drain for mosquito larvae while an emu looks on.



For more information on the EPA Pesticide Environmental Stewardship Program: <http://www.epa.gov/oppbppd1/PESP/>