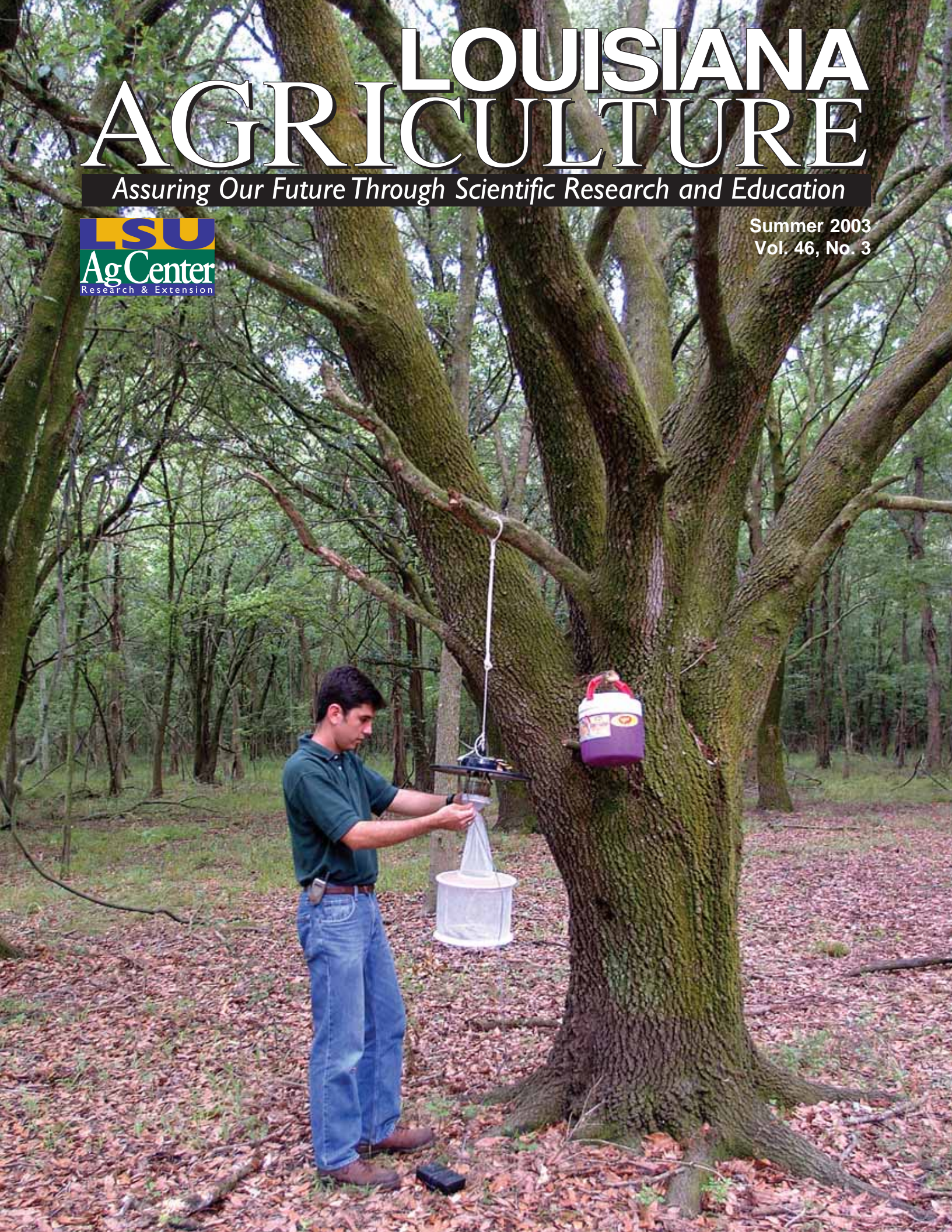


LOUISIANA AGRICULTURE

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Ahead of the Curve on Mosquitoes

As we headed into mosquito season in June 2002, the LSU AgCenter sponsored a one-day conference on mosquito-borne diseases. This was the first such conference ever hosted by the AgCenter and perhaps the first of its type in the country. Then, no one foresaw the severity of the West Nile virus to come.

On the agenda for the conference were the mosquito and mosquito-borne disease experts at the AgCenter and in Louisiana. Roger Nasci, an entomologist with the Centers for Disease Control and Prevention in Fort Collins, Colo., presented the national perspective.

By the fall of 2002, the West Nile virus situation had reached a crisis. But Louisiana was well-positioned to expand educational and research programs.

In September 2002, the Louisiana Department of Health and Hospitals/Office of Public Health (DHH/OPH) provided funds for AgCenter agents and others to survey the numbers and types of mosquitoes in the parishes where people had contracted West Nile but there was no mosquito abatement program. See page 15 for the story of "Operation Mosquito."

Another effort was the "Be a Skeeter Buster!" 4-H program. AgCenter educators armed 4-H'ers across the state with lesson plans and materials that they in turn presented at their schools and to their friends and families. Family and consumer sciences agents also distributed warning materials to the elderly, the group at most risk for West Nile.

In the spring of 2003, the AgCenter spearheaded a series of eight workshops to help the 44 of the 64 parishes in the state with no sustained mosquito abatement program to develop one. Thirty-six of the 39 parishes that sent participants to the workshops prepared a control plan and a proposal to fund it. Read more about the workshops on page 19.

Because of demand, the AgCenter sponsored a second one-day conference on mosquito-borne diseases on April 30, 2003. The agenda and speakers were similar to the year before, including a return visit by Nasci.

He told the group that West Nile is more threatening than other mosquito-borne diseases. He said in 1998, the first year of West Nile in this country, the virus was found in 26 of the 4,000 or so counties nationwide. But four years later, the virus was in 1,947 counties and had spread to 42 states and the District of Columbia.

Both Nasci and Raoult Ratard, the Louisiana state epidemiologist, predict further problems with this disease.

Mosquitoes are here to stay. Louisiana has 68 distinct types, and new, more ominous species have the potential to enter our country as the speed and convenience of trade and travel increase.

The best defense is knowledge, and that's where the LSU AgCenter comes in. Since 1965, our scientists have been conducting research and extension programs on mosquitoes and their control. In 2002, the AgCenter was ahead of the curve in stepping up educational efforts. ■ **Linda Foster Benedict**

Photo by Mark Claesgens



Matthew Yates, director of mosquito control for East Baton Rouge Parish in Louisiana, talks about surveillance at the LSU AgCenter's mosquito-borne disease conference in 2003.

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ON THE COVER

Gerardo Boquin, research assistant in the Department of Entomology, checks a mosquito trap. The cooler hanging next to the trap contains dry ice, which helps attract the insects. Mosquito research is directed by Michael Perich. Read more beginning on page 15.

'Operation Mosquito' Fights Bites

Michael J. Perich and Raquel M. Gleiser

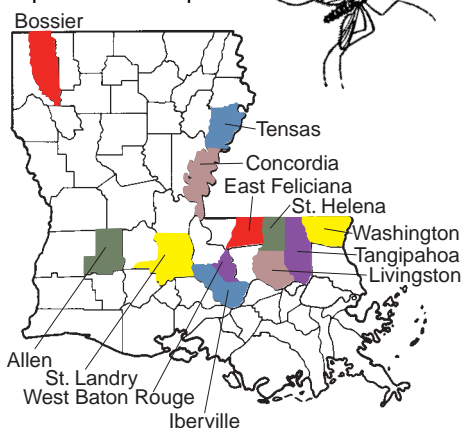


The tropical and subtropical climate in Louisiana creates conditions that support mosquitoes year-round. Mosquitoes are not only a nuisance but, more important, can transmit several diseases to people and domestic animals when biting for a blood meal. Louisiana is historically host to several viral mosquito-borne diseases such as St. Louis encephalitis, eastern equine encephalitis and LaCrosse-California encephalitis. As recently as 2001, West Nile virus was first reported in the state. In 2002, Louisiana ranked among the top five states in the nation in number of West Nile encephalitis cases, and first when cases per inhabitants were taken into account.

The outbreak of West Nile virus in Louisiana in 2002 led to a cooperative venture between the LSU AgCenter and the Louisiana Department of Health and Hospitals Office of Public Health (DHH/OPH).

In the summer of 2002, DHH/OPH funded a team of LSU AgCenter entomologists and other personnel to conduct Operation Mosquito, the mosquito surveillance component of the AgCenter's West Nile Virus Mosquito Program. Team members, led by entomologist Michael Perich, collected mosquitoes in 12 parishes that had reported a human case of West Nile but were without organized mosquito abatement programs. The purpose was to determine what potential vectors of West Nile were present and to gather information on the mosquito abundance in these parishes.

Figure 1: Parishes surveyed in Operation Mosquito.



For each of the parishes, 10 sites in proximity to reported West Nile cases and also representing the various ecological habitats within that parish were selected for samples. Sampling was initiated on Sept. 3, 2002, for eight parishes (Allen, East Feliciana, Iberville, Livingston, St. Helena, Tangipahoa, Washington and West

Baton Rouge) and the other three parishes on Sept. 10, 2002 (Bossier, St. Landry and Tensas). See Figure 1.

Mosquitoes were collected three times a week for nine consecutive

Michael J. Perich, Assistant Professor, and Raquel M. Gleiser, Postdoctoral Researcher, Department of Entomology, LSU AgCenter, Baton Rouge, La.

Figure 2: The gravid trap is used primarily to collect southern house mosquitoes, which are carriers of St. Louis encephalitis and West Nile virus, and the Asian tiger mosquito, also a carrier of West Nile virus. The trap includes a pan filled with water and organic matter to attract the mosquitoes. A fan inside the net trap draws in the mosquitoes.

Photo by John Wozniak



Figure 3: The CDC (for Centers for Disease Control) miniature light trap is typically hung from a tree and includes a light to attract flying mosquitoes and a fan to suck them into the white net tube. The cooler hanging next to the trap contains dry ice, which is carbon dioxide (CO₂) in a solid state. CO₂ attracts mosquitoes.



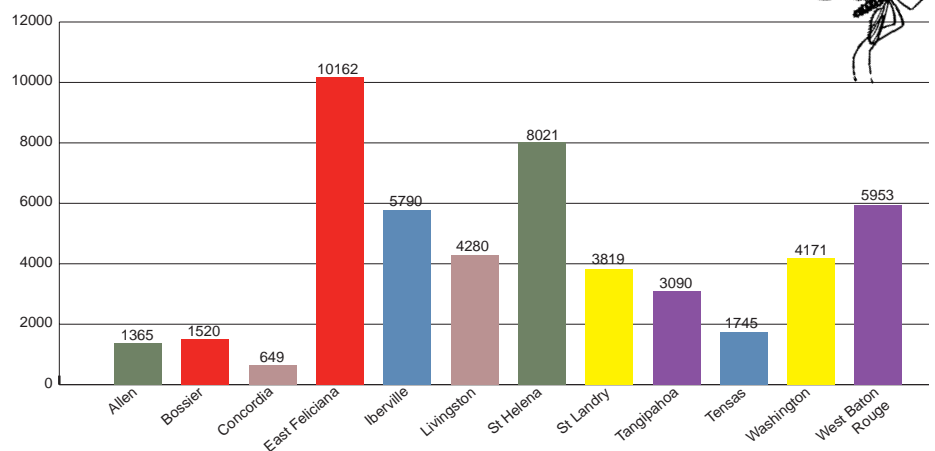
weeks, using gravid traps (Figure 2) and miniature light traps (Figure 3), both in urban and rural areas near confirmed human West Nile cases. Gravid traps were used to assess the presence, distribution and abundance of the southern house mosquito (*Culex quinquefasciatus*), the principal vector, which means carrier, of St. Louis encephalitis and West Nile virus, and the Asian tiger mosquito (*Aedes albopictus*), also a vector of West Nile. Light traps were used to determine what other potential mosquito vectors were in each parish. In addition, ovitraps were deployed to sample for the Asian tiger mosquito. The collaboration of the county agents, who operated the traps, sorted and delivered the mosquitoes to the AgCenter medical entomology laboratory for identification, was essential for the success of the project.

More than 160,000 mosquitoes were collected in the combined CDC light traps and gravid traps, representing the 10 genera of mosquitoes known to occur in Louisiana, and 43 of the approximately 64 species reported for the state. Not all species were present in every parish, and their relative importance in terms of number of mosquitoes collected varied as well (Figure 4).



Student worker Lana Gallego holds a trap full of mosquitoes.

Figure 4: Total number of southern house mosquitoes (*Culex quinquefasciatus*) in each parish surveyed during Operation Mosquito.





The Asian tiger mosquito likes to lay eggs in standing water. Gerardo Boquin, research assistant, inspects likely breeding areas for mosquitoes.



Because of this variation in the mosquito populations, the approaches to mosquito control will be different for each parish. For example, in more urban areas with higher populations of container-breeding mosquitoes (such as the Asian tiger mosquito), parish officials will have to invest more time and resources in sanitation and public education campaigns. In more rural areas, they need to target natural mosquito habitats such as rice fields and poorly drained areas.

Some factors affected the total number of mosquitoes collected, such as spraying for mosquito control in five parishes (East Feliciana, Livingston, St. Landry, Tangipahoa and Washington) by the Louisiana Department of Agriculture and Forestry. Collections had to be interrupted on a few occasions because of tropical storm Isidore and Hurricane Lili. The number of mosquitoes, specifically floodwater mosquitoes, increased dramatically in weeks following the tropical storm and hurricane (Figure 5).

The information gathered during Operation Mosquito provides a starting point for the organization of mosquito



The ovitrap is placed in areas where there is standing water. It includes a black plastic cup half filled with water, with a wooden paddle or paper strip resting inside. The mosquito lays eggs on this strip.

abatement programs. We know what mosquito vectors and nuisance species are present in each parish. Besides the survey, a series of recommendations for arbovirus vector surveillance were provided as part of Operation Mosquito (Table 1).

A further project developed by the AgCenter and funded by DHH/OHP, with input from the Louisiana Mosquito Control Association and its technical advisory committee and the Louisiana Office of Agricultural and Environmental Sciences of the Louisiana Department of Agriculture and Forestry, has resulted in a template for organizing and instituting mosquito abatement districts, known as the Louisiana Mosquito Abatement Plan or LaMap. The LSU AgCenter is working closely with parishes involved in Operation Mosquito to adapt LaMap to specific needs and budgets and to help officials apply for special funding. ■

Acknowledgments

County Agents: Randall Bellon (Allen Parish), Marion Farris (Red River), Glen Daniels (Concordia), Brian Chandler (East Feliciana), Harry Laws (Iberville and West Baton Rouge), Kenneth Sharpe (Livingston), Gerald Roberts (St. Landry), James Devillier (East Feliciana), Stefen Givens (St. Helena), Sandra Benjamin (Tangipahoa), Robert Goodson (Tensas), Audrey Posey (Washington)

Mosquito identification: Jack Baldwin, Gerardo Boquin, Chris Carlton, Brett Collier, Mary Claire Delony, Stephanie Gil, Andrew MacKay, Victoria Moseley, Lisa Peri, Michael Perich, Laura Rodriguez, Raiza Rodriguez, Ana Maria Sanchez.

Figure 5. Total number of mosquitoes collected by CDC light traps and gravid traps for Livingston Parish. Floodwater mosquito numbers increased following tropical storm Isidore and Hurricane Lili. Red arrows indicate the weeks when LDAF sprayed the parish.

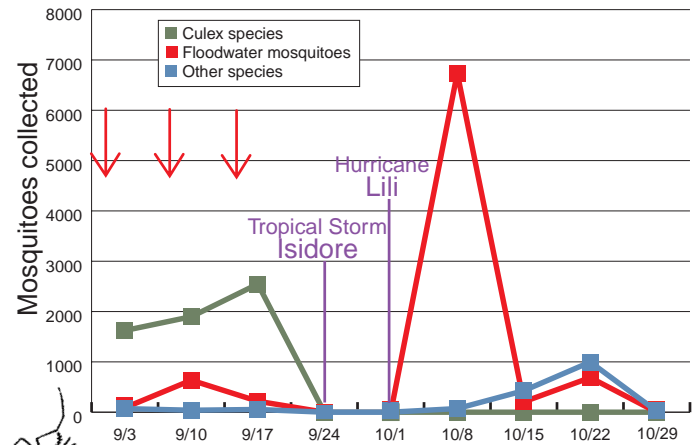


Table 1. Recommendations for Mosquito Surveillance

- Use personnel trained in mosquito taxonomy for mosquito identification.
- Use more than one adult mosquito sampling technique (gravid and CO₂ light trapping).
- Include larval mosquito sampling as well as adult.
- Map mosquito (adult and larvae) collection sites.
- Have maps GIS/GPS-referenced, if possible.
- Sample at least weekly.
- Maintain accuracy of records.
- Base adult mosquito trap locations on historical arbovirus cases; also include all ecological habitats within the surveillance area.
- Regularly assess and modify as needed vector sampling techniques, equipment and personnel.

Mosquito Facts

Mosquitoes don't need blood to live. Their main energy source is nectar from plants. But females must consume blood before they can lay eggs, so only the females bite.

Females live only about a week to 10 days and need a three-day cycle from the time of a blood meal to the time of laying eggs. A female will lay eggs only two or three times during a lifetime.

Most mosquitoes don't travel far from their birthplaces, especially those that breed in urban habitats. However, marshland mosquitoes can travel 10 to 12 miles looking for water and blood meals in dry weather.

Mosquitoes are attracted to blue lights and dark clothing, but not to reds and yellows. They are especially attracted to carbon dioxide.

They also are attracted by heat and aromas. Some people attract mosquitoes because of the way they smell or because of a slightly higher body temperature. So, stay cool and scents-less!



If the mosquitoes are to be tested for viruses, they must be frozen for transport back to the lab.



Raquel Gleiser, postdoctoral researcher, examines mosquitoes under a microscope.

Workshops Arm Parishes for Mosquito Battle

Byrel Book, a Beauregard Parish police juror, started out as a skeptic at a West Nile virus/mosquito control workshop in Crowley—one of eight sessions held around the state sponsored by the LSU AgCenter this past April and May.

When the session ended, though, Book said he was convinced of the need to seek funds to help fight the threat of the mosquito-borne virus. The virus first appeared in Louisiana just two years ago. But no one expects it to disappear any time soon.

In 2002, Louisiana had 329 confirmed cases of West Nile virus in humans, and health officials expected the disease to be a serious threat again in 2003. Nationally, more than 4,000 people were infected in 2002, with the most serious cases affecting the elderly and people with other health problems.

“I’m sure we’re not the only parish government considering it,” said Book, when asked about the possibility of applying for a share of \$500,000 in state and federal money available through Louisiana’s Department of Health and Hospitals/Office of Public Health.

The funds were made available to parishes that don’t yet have a mosquito control district. Book represents one of the 44

parishes in Louisiana without a district, an alarming statistic that led the LSU AgCenter to hold the workshop series.

The goal of the workshops was to show local officials how to set up affordable mosquito control programs to fight the Asian tiger and southern house mosquitoes, the two types considered the biggest threats to infecting humans with West Nile, a mosquito-borne virus that can cause meningitis and encephalitis.

AgCenter economist Kurt Guidry outlined how mosquito budgets can be adjusted to fit the money available. “One size budget does not fit all communities,” Guidry said.

Mosquito Control Blueprint

The all-day sessions gave parish officials across Louisiana a blueprint for starting a mosquito control district, an endeavor that could cost each locale \$500,000 to \$1 million a year, depending on personnel costs and equipment.

But the message was this: Get started with a program you can afford and then build from there.

“When I worked in mosquito control in East Texas, we had