

# Potential Management Options for the Roseau Cane Scale, Including Biological Control via Parasitoid Wasps

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Roseau cane (*Phragmites australis*) is a dominant plant in the lower Mississippi River Delta. This emergent wetland reed develops thick underground rhizomes, which are the primary source of propagation. Stems of Roseau cane can grow taller than 9 feet in ideal conditions; however, the rhizomes constitute about two-thirds of the total plant biomass. Roseau cane provides essential services that benefit the environment and economy in the Mississippi River Delta. Those services include sequestration of carbon, retention of sediments, reduction of wave action, and protection of wildlife habitat and human infrastructure from erosion and storm events. In the fall of 2016, Roseau cane die-back, characterized by premature senescence and reduced cane growth was reported by concerned landowners in Plaquemines Parish.

Hundreds of scale insects were observed on cane stems collected from die-back sites. These insects were identified as *Nipponaclerda biwakoensis* (Hemiptera: Acleridae), commonly known as the Roseau cane scale, which is native to Asia. The scale can be found between the leaf sheath and the stem. The life cycle of this scale begins with a crawler, which is the only life stage able to walk. The crawlers can also disperse long distance via birds or wind. Once the crawler settles on the stem, it becomes a pale-colored, oval-shaped nymph. This nymph develops a waxy layer along the edges of its body and sheds its legs (Figure 1). The nymph begins to suck fluids from the cane stem and gradually matures. Adult male scales of this species are flightless and are incredibly small when compared to females, which can grow to more than 15/64 of an inch long. Females become darker in coloration as they mature. Mature females can be distinguished from nymphs by the presence of hundreds of tiny eggs, which can be observed under a scope. Once mature, those eggs will emerge from the female as crawlers and start the cycle anew.

Since the discovery of the Roseau cane scale in the Mississippi River Delta in 2016, several studies have emerged to understand the role of the scale and other stressors in the cane die-back. A host range study found that the Roseau cane scale can only develop on Roseau cane; however, crawlers were able to survive for limited periods on California bulrush (*Schoenoplectus californicus*) and smooth cordgrass (*Spartina alterniflora*). Greenhouse experiments demonstrated that the scale cannot develop on corn (*Zea mays*), sorghum (*Sorghum bicolor*), rice (*Oryza sativa*), sugarcane (*Saccharum officinarum*), Jamaica swamp sawgrass (*Cladium jamaicense*), giant cutgrass (*Zizaniopsis miliacea*), para grass (*Urochloa mutica*), maidencane (*Panicum hemitomon*), seashore paspalum (*Paspalum vaginatum*), giant reed (*Arundo donax*) and annual wild rice (*Zizania aquatica*). Current studies focus on whether plant resistance among different varieties of Roseau cane could be a management option. In the scale's native range, Chinese farmers cut, burn and flood Roseau cane to reduce pest populations and remove potential overwintering sites.

To combat infestations in Louisiana, a landowner's most effective allies are the scale's natural enemies: parasitoid wasps. As part of their life cycle, parasitoid wasps lay their eggs inside of a host. Those eggs then develop into larvae, which eat their host, a process that kills it, and then emerge as adults. In Louisiana, there are four species of parasitoid wasps that target the Roseau cane scale, *Astymachus lasallei*, *Neastymachus japonicus* (Figure 2), *Aprostocetus* sp., and *Boucekiella depressa*. These wasps are smaller than the width of a grain of rice and are difficult to identify with the unaided eye.

In 2018, a study found that these wasps were responsible for 18% to 56% of adult scale mortality. Parasitism rates were seasonal: Fewer scales were parasitized in the cooler seasons compared to the summer and late fall, where parasitism rates increased with the growing scale populations. The use of insecticides is not recommended to control the scale. The scale inhabits the space between the Roseau cane's stem and leaf sheath, which insecticides have difficulty penetrating, therefore reducing the efficacy of insecticides. Instead, these insecticides may negatively impact parasitoid populations. Parasitoid wasps that have emerged from scales move to new locations to find scales to parasitize and are more likely to come into contact with insecticides.

For more information, please visit the LSU AgCenter Roseau cane die-back website: [www.lsuagcenter.com/roseaucane](http://www.lsuagcenter.com/roseaucane).

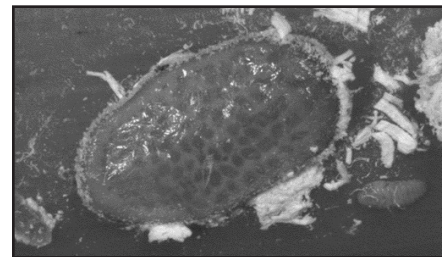


Figure 1. Mature female Roseau cane scale (top) with visible eggs inside. Smaller male (bottom) is also depicted below the female.



Figure 2. Image of *Neastymachus japonicus*, a small parasitoid wasp of the Roseau cane scale.

# Worker Protection Standard (WPS)

The Environmental Protection Agency (EPA) Agricultural Worker Protection Standard (WPS) is aimed at reducing the risk of pesticide poisoning and injury among agricultural workers and pesticide handlers. Pesticide applicators must comply with this OSHA regulation when using agricultural use pesticide products that reference the Worker Protection Standard, 40 CFR 170. In 2015, the EPA made major revisions to the Worker Protection Standard (WPS).

The LSU AgCenter has since worked to provide an updated WPS Train-the-Trainer program that is approved by the EPA. In Louisiana, those employers who wish to train their own workers and handlers (or other workers and handlers on nearby agricultural establishments) must be certified pesticide applicators and have been trained in the new WPS Train-the-Trainer program provided through the LSU AgCenter. Note: all agricultural workers and handlers (who work with or around applied pesticides and who work for one of these four establishments: farm, forest, plant nursery or greenhouse operation) must be trained on a yearly basis with approved training materials.

If a pesticide applicator who has had “WPS Trainer status” has attended a WPS Train-the-Trainer program prior to November 2016, then he or she must attend an updated WPS Train-the-Trainer program. Once this training has been completed, the “WPS Trainer” category will be added to the back of their pesticide certification card. This WPS Trainer certification will be renewed when they attend their normal pesticide applicator recertification meeting, on their three-year recertification cycle. Training dates and locations can be found at [www.lsuagcenter.com/pesticide](http://www.lsuagcenter.com/pesticide). (Select the WPS tab.)

If you would like to receive WPS Train-the-Trainer training so that you will be certified to administer WPS worker/handler training to workers who perform work around or with agricultural pesticide products, please email [LSUAGPSEP@agcenter.lsu.edu](mailto:LSUAGPSEP@agcenter.lsu.edu) and someone at the LSU AgCenter’s Pesticide Safety Education Program will assist you.

As part of the revised rule there are a few things that need to be pointed out:

- Workers and handlers must be trained every 12 months.
- WPS trainers must participate in the new EPA-approved Train-the-Trainer Program (See information above).
- Workers and handlers must be trained by using EPA-approved training materials
- No longer using the card system for records of training. You must maintain the following worker/handler annual training information:
  - Trained worker’s printed name and signature.
  - Date of the training.
  - Information identifying which EPA-approved training materials were used.
  - The trainer’s name (and certification number) and qualification to train.
  - The worker or handler employer’s name.
- The LSU AgCenter has created a record-keeping form that you are welcome to use. If you would like to download a training verification form for WPS, please do so by going to the LSU AgCenter’s PSEP website (within the WPS tab).
- Must retain records of training of workers and handlers for at least two years.
- Maintain the following information at a central location:
  - New safety poster <https://npsecstore.com/collections/posters>.
  - Application records.
  - Emergency medical contact information.
  - SDS (safety information).
- When using a pesticide that requires a respirator, employers must:
  - Have an employee medically evaluated by a physician or other licensed healthcare professional.
  - Have employees go through an annual fit test for each type of respirator required by the pesticide product label.
  - Have the employee participate in annual training on how to properly use the respirator(s).
  - Maintain records for two years of the completion of the above, respirator requirements.

The ***How to Comply Manual*** is a great reference guide and can be ordered at [www.npsecstore.com](http://www.npsecstore.com).

To get more information about the WPS revised rule you will need to refer to the final rule at <https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps>.

Where to get updated information:

- [www.lsuagcenter.com/pesticide](http://www.lsuagcenter.com/pesticide)
- <https://npsecstore.com/> (for the new poster and other important WPS materials)
- <https://www.pesticideresources.org/> (to get EPA approved worker/handler training materials)

This section was revised by Bryan Gueltig.

# Insect Identification Services

The LSU AgCenter, LSU Department of Entomology, and Louisiana State Arthropod Museum (LSAM) offer insect identification services for the citizens and stakeholders of Louisiana.

Due to the diversity of insects in our state and the diversity of places where insects are found, we have established a standard operating procedure to best serve you. If you have an insect (or arthropod) that you are concerned about, either for crop health, garden health, or personal health reasons, please follow the steps below. Note: Although we are interested in all insects, please refrain from submitting specimens that are simply interesting or curious to you! The internet is a great source of information, and we do our best to provide services to insects of potential impact.

## Identification Procedure

1. Either photograph or collect the insect in the appropriate manner (requirements provided below). Note: if you have an infestation or more than one insect is present, it is often useful to image or collect several, as this may assist in identification.
2. Submit the image or specimen and associated data to your parish/county extension agent. A complete list of agents is available here: <https://www.lsuagcenter.com/portals/it/find-your-agent>
3. The parish/county agent will respond with identification and specimens of particular importance will be sent to the Department of Entomology at LSU for confirmation and/or vouchering.
4. In the event the parish agent cannot successfully identify the insect, he/she will contact Victoria Bayless, Curator of the LSAM, and state insect identifier. She will work with the parish agent, faculty, and staff in the Department of Entomology to identify the specimen.

## Photo Requirements

In order to provide a **rapid** and **accurate** identification, we have requirements necessary for all submissions. Any submissions not meeting these minimum requirements can result in delays in identification or an inability to provide an accurate and confident response.

### Photos of Insects - Requirements

1. The insect is in-focus (not blurry)
2. There is something for scale included in the image (a coin, a pen/pencil, ruler, etc.)
3. Appropriate data is provided with the image
  - Date image was taken.
  - Location of the image (parish + nearest town are good, GPS coordinates are best).
  - Submitter's contact information, including name, phone, email, and address.
  - Additional notes that may be helpful, including where the insect was collected, why it is a suspected pest, etc.

The submission portal for images and associated information is here:

<http://forms.lsuagcenter.net/form.aspx?pid=55d2084f-b9d4-4d70-8ba5-186f35f6fc5e&formid=f4e73049-df5c-4e7d-8313-2d03b7125962>

## Dead Specimen Requirements

Submission of the actual insects themselves is the best way to receive a confident identification. This process takes time, however, and some important requirements must be followed to make an identification as quickly as possible. Note: we will not accept any bodily tissues or fluids. If the samples appear to be unhygienic and/or pose a health concern, we will incinerate without identification.

- In order to kill an insect, simply collect into a sealed container (plastic zipper baggie, pill bottle, etc.) and freeze for several hours (overnight preferred). Insects are extremely hardy and may re-animate if not frozen for at least several hours!
- If the insect is soft-bodied ("squishy," e.g., caterpillars, fly maggots, etc.), they can be placed in a sealed container of rubbing alcohol, ethanol, or even white vinegar for preservation. If this is not done, the specimens will shrivel, likely making identification impossible.

**Insect Specimens - Requirements**

1. The insect is dead and in a sealed container (see above).
2. Appropriate data is provided with the insect
  - Date collected.
  - Location where insects were collected (parish + nearest town are good, GPS coordinates are best. When possible, please use decimal degrees to four decimal places).
  - If the insect is in fluid, you *must state* what the fluid is (e.g., rubbing alcohol).
  - Submitter's contact information, including name, phone, email, and address.
  - Additional notes that may be helpful, including where the insect was collected, why it is a suspected pest, etc.
3. Ship specimen(s) to the address below. If the specimen is in rubbing alcohol or ethanol, please ensure it is packaged appropriately to avoid leakage.

**Specimens should be sent to the following address:**

Insect Identification Services  
c/o Department of Entomology, LSAM  
404 Life Sciences Building, Louisiana State University  
Baton Rouge, LA 70803

## Insect Identifiers for Louisiana State University Entomology Department

When mailing large specimens please send as complete and non-damaged a specimen as possible. For microscopic specimens please follow the guidelines below. Photographs can be sent directly to the emails below.

**Forest Huval:** Insect Identification (Physical Specimens and Photo ID), life history and general control.

Email: [fhual@agcenter.lsu.edu](mailto:fhual@agcenter.lsu.edu)

Office: 225-578-1634

Mail Specimens to Entomology Department

402 Life Sciences Rm 404, Baton Rouge, LA 70803 with email indicating you have specimens being delivered.

**Chris Carlton:** Insect Identification (Photo ID), life history, no chemical control recommendations.

Email: [ccarl@lsu.edu](mailto:ccarl@lsu.edu)

**Victoria Bayless:** Insect and Spider identification no chemical control recommendations (Physical Specimens and Photo ID).

Email: [vbayless@agcenter.lsu.edu](mailto:vbayless@agcenter.lsu.edu)

Send specimens to: PO Box 139, Rosedale, LA 70772 with email indicating you have specimens being delivered.

Office: 225-578-1634

**Kristen Healy:** Public health entomology, medical entomology, and pollinators; some control recommendations.

Email: [khealy@lsu.edu](mailto:khealy@lsu.edu)

Office: 225-578-7386

**Karen Sun:** Identification of termites and ants; some control recommendations.

Email is preferred method of contact

Email: [qsun@agcenter.lsu.edu](mailto:qsun@agcenter.lsu.edu)

Office: 225-578-1831

**Aaron Ashbrook:** Urban and Peri-urban insects, household, gardens, lawns; some control recommendations.

Email: [aashbrook@agcenter.lsu.edu](mailto:aashbrook@agcenter.lsu.edu)

Office: 225-578-1634

**Mike Stout:** General questions about the Entomology Department, agricultural pests

Email: [mstout@agcenter.lsu.edu](mailto:mstout@agcenter.lsu.edu)

Office: 225-578-1634

