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 rhizomes underground, and they 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 but are not limited to the 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 heavily infested cane stems retrieved from die-back sites. These insects were identified as *Nipponaclerda biwakoensis* (Hemiptera: Aclerdidae), commonly known as the Roseau cane scale, which is native to Asia. On stems of Roseau cane, 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. It can also disperse via animals 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 three species of parasitoid wasps that target the Roseau cane scale, *Astymachus lasallei, Neastymachus japonicus* (**Figure 2**), 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.

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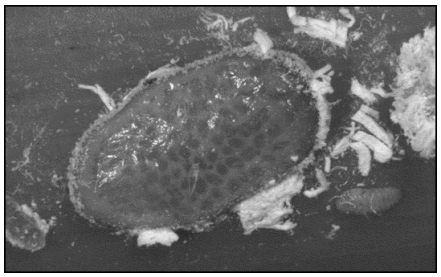

Figure 1. Mature female Roseau cane scale (top) with visible eggs inside. Smaller male (bottom) is also depicted below the female.

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