# Plant Protection Today: PPQ Shares Methods to Aid Foreign Giant African Snail Eradication Programs

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## Sharing Knowledge Internationally Strengthens Plant Protection Globally

*By April Dawson*

The giant African snail feeds on more than 500 types of plants, including peanuts, beans, peas, cucumbers, and melons. Photo by Yuri Yashin, achatina.ru, Bugwood.org.

The giant African snail (GAS) makes the perfect poster child for invasive plant pests. This big, slimy, and rapidly reproducing mollusk can feast on more than 500 types of plants and can carry a parasite that can cause meningitis in humans.

The U.S. Department of Agriculture’s Plant Protection and Quarantine (PPQ) program and the Florida Department of Agriculture and Consumer Services eradicated two incursions of this pest in southern Florida, and we are currently battling a third in central Florida. PPQ and cooperators have gained a lot of valuable knowledge on how to eradicate and contain this pest, and now we are sharing this knowledge with other countries.

This past August, our Treatment and Inspection Methods Lab (TIML) presented a 3-hour workshop on the methods developed by TIML and cooperators to help eradicate GAS in south Florida. The audience included international delegations from the Dominican Republic and Costa Rica looking for help designing GAS eradication

programs in their countries.

TIML scientists and cooperators shared PPQ's recent efforts to develop methods and tools that can be applied in the eradication process, including efficacy testing for pesticides and attractants, biological and behavioral studies, and the development of synthetic canine training aids based on the odor profile of live GAS.

Based on research conducted by PPQ and cooperators, PPQ used metaldehyde, the most effective pesticide to control GAS. The team found that "softer" pesticides were not as effective and observed that the pesticides seemed to cause snails to move to another area.

PPQ conducted nighttime studies to determine the peak time of activity of GAS and how far snails moved in a night. The team found that snails cluster in areas that are favorable and protected and often return to the same location. The team showed the benefits of searching for the snail at night when they are the most active and the optimal location to place the bait.

The giant African snail behavior study used different colored flags to represent snail movement over the course of a night. The red flags form a grid so surveyors can record how far a snail moved. The yellow flags show the snails' daytime resting spots. The white flags show how far a snail moved between observations.

The team tested multiple non-toxic attractants to lure snails out of hiding, including bananas, sesame seed oil, papaya-flavored oil, reconstructed papaya-flavored oil, and fermenting bread dough. "We found that the snails were consistently more attracted to metaldehyde when combined with synthetic lure based on the odor of papaya-flavored oil," said Amy Roda, a scientist at TIML. "We identified the

chemicals that were producing the odors of the attractive papaya oil, and we were able to synthesize a lure that was just as attractive.”

Papaya-flavored oil draws a giant African snail (next to red arrows) from its daytime hiding location, and it moves across rocks to reach it.

## Additional detection techniques

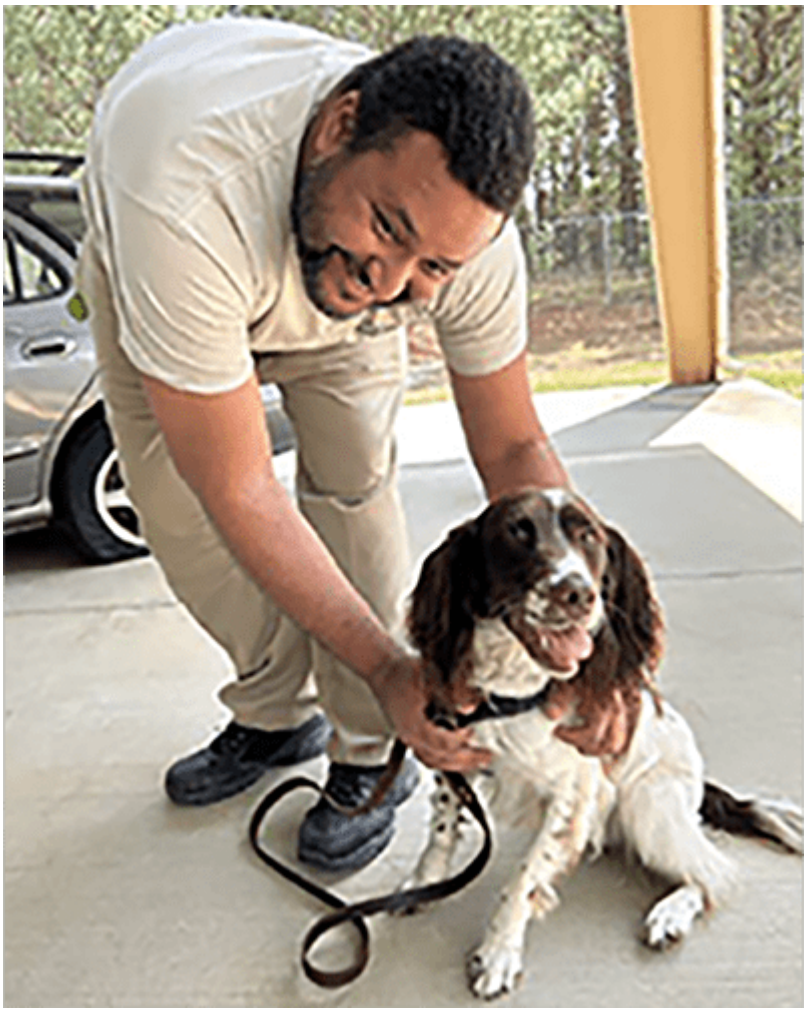
PPQ’s Byron Franklin takes a break with giant African snail detector dog Ruedy. USDA photo by Jodi DaughertyPesticides and food attractants aren’t the only method for eradicating GAS. Surveyors use detector dogs to find snails. These four-legged surveyors are an important tool for finding hidden snails and detecting snails even when their population is low. They were an important tool for declaring an infested property snail-free. The dogs can also help in studies to determine whether GAS has a chemical signature or odor profile.

Back in March, TIML scientists worked with the National Detector Dog Training Center (NDDTC) canine teams in Newnan, GA, to field test candidate odor profiles of GAS. The dogs tested whether a synthetic snail odor profile could be used instead of live snails. To make a synthetic odor profile, our scientists identified several biologically active compounds from live snails from a colony and the wild. These compounds were not found in frozen GAS or other snail species.

These compounds are commercially available, non-toxic, and long-lasting, making them good candidates for a training tool. The south Florida GAS canines fully alerted to the target test odors that were hidden in the landscape. A third canine, which had trained with a live similar species of African snail (*Archachatina marginata)*, showed strong interest in the test compounds when it was placed in the field.

The new canines, trained with only frozen snails, did not respond to frozen wild snails collected from Hawaii or to the test compounds. The tests indicate that the identified compounds may help canines connect frozen snail odors to live GAS when deployed in the field.

While training tools for dogs are still in process, everything TIML has learned will undoubtedly help other countries apply these effective strategies to manage and eradicate GAS and help slow the spread of the pest. Eradication of GAS from the Dominican Republic and Costa Rica would protect the United States against incursions from these countries.



PPQ’s Byron Franklin takes a break with giant African snail detector dog Ruedy.

## Cooperators

A large collaboration of institutions worked to develop these methods, including PPQ Field Operations in Florida, the NDDTC, USDA’s Agricultural Research Service (in Miami, FL, and Hilo, HI), the Florida Department of Agriculture and Consumer Services, the University of Hawaii, the University of California Riverside, Oregon State University, and the University of Copenhagen.

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