## CENTER FOR MEDICAL, AGRICULTURAL, & VETERINARY ENTOMOLOGY


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# FUTURE SCIENCE:

# FUTURE SCIENTISTS:

We are committed to providing enhanced training for graduate and undergraduate students, including more experiential learning and field research toward implementation of IPM (Integrated Pest Management) programs for insect pests.

# BEHAVIOR & BIOCONTROL

**USDA, ARS**

**at**

## CENTER FOR MEDICAL, AGRICULTURAL, & VETERINARY ENTOMOLOGY


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**and at**

## CENTER FOR BIOLOGICAL CONTROL


**Florida A&M University**
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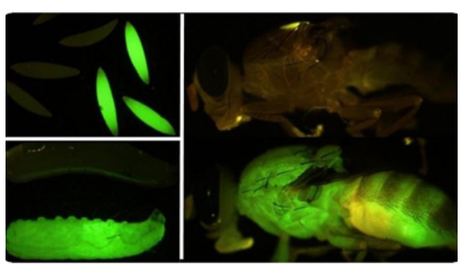
***Novel and environmentally friendly solutions to old and new agricultural problems***

Fruit flies such as Florida's Caribbean fruit flies attack hundreds of fruits and vegetables and hinder the export of agricultural commodities wherever they occur. Should the Medfly become established in Florida, it would cost the state hundreds of millions of dollars a year in expenses and lost revenues. We are exploring new technologies to integrate parasitic wasps into fruit fly control.

The genetic element "piggyBac," used to transform insects by moving genes from one animal to another, may improve Sterile Insect Technique and develop new biocontrol methods for fruit fly and moth pests. We now are working on "transposase-safe" DNA, which allows the use of genetically modified insects without any danger of inadvertently spreading foreign genes.



Here, the green fluorescent protein (GFP) from a jellyfish makes transgenic Caribbean and Mediterranean fruit flies glow under ultra-violet light. Flies marked with GFP and released will be easily distinguished from the targeted wild flies in the field.

Weedy plants threaten pastures, forests, and water-ways. Biological control using plant-feeding insects has a long history of success rescuing agricultural and public lands. We have programs to attack pest plants such as tropical soda apple and hydrilla with insects imported from around the world.

Acoustic and microwave radar systems are being developed to detect insects hidden underground, in stored-products, or on plant and trees.

Artificial diet for mass rearing predator are being improved through discovery of key nutritional factors from prey and biochemical and immunological tests are being developed to evaluate the fitness of predators and improve their performance in the insectary and field.


The fall armyworm (FAW) is a pest of corn, sorghum, forage grasses, turf, peanuts, cotton, sugarcane, peppers and other important crops. In outbreak years it causes hundreds of millions of dollars in damage. FAW is present all year in southern Florida and southern Texas, and each spring they begin to migrate as far north as southern Canada. We are developing means of stopping the moth in its tracks before it begins its northward movement.

**HOW CAN YOU HELP?**

Southern Florida sweet corn growers can help our research by allowing us to sample their fields. If interested, please contact Rob Meagher.

An alternative to pesticide use is the use of biocontrol agents, natural organisms that interfere with crop pests as part of their life cycle, such as parasitoid wasps that lay their eggs in the larvae of pest insects. The eggs hatch to produce parasitoid larvae which grow inside and eventually kill the pest insect larvae. This method of biocontrol has been shown to be effective, but is problematic because of the labor costs of rearing the parasitoids. One way to cut production costs in half would be to produce all-female strains (since only females lay eggs, only females are needed). Certain types of endosymbionts, such as *Wolbachia*, can result in all-female reproduction, known as parthenogenesis. We are looking into *Wolbachia* and other mechanisms of parthenogenesis as the means to eventually lower production costs of parasitoid biocontrol agents.

We collaborate closely with APHIS, the "action arm" of USDA. APHIS personnel at CMAVE take our research and use it to develop practical methods of insect monitoring and control. For example, studies of parasitoid ecology and behavior are translated into improved natural enemy mass-rearing and introduction.