

Students get International Exposure

In an increasingly globalized world, it is important for our students to be globally smart. To this end, the Center is linking its international research with providing opportunities for students to conduct research or intern abroad. Thus, Mr. Antonio Francis (Ph.D. Student) is conducting research in Trinidad on *Planococcus minor*, a serious invasive pest threat to the United States. Ms. Shalom Sierbert (B.S. Entomology Student), spent a month in Ecuador, working as an intern on a collaborative project. Students are also taking opportunities for greater exposure at the national level. For instance, Mr. Keith Marshall (B.S. Entomology Student) spent the last summer as an intern working with entomology faculty in Purdue. This summer, Ms. Oulimathe Paraiso (Ph.D Student), interned at the USDA-APHIS Center for Plant Health Research, Raleigh, NC.



Ms. Shalom Sierbert (forefront)
in Ecuador

INSIDE THIS ISSUE

<i>A Year Of Change</i>	2
<i>Advisory Committee Meeting</i>	2
<i>People In The News</i>	3
<i>Training News</i>	3
<i>Student Awards</i>	4
<i>Research Reports</i>	5
<i>Publications</i>	9
<i>Outreach Activities</i>	10

Dr. Moses T.K. Kairo
Director, FAMU CESTA-CBC

Dr. Stuart R. Reitz
Co-Director, USDA-ARS-CMAVE-CBC

Vacant
Co-Director, USDA-APHIS-CBC

Dr. Sunil K. Pancholy
Associate Dean for Research, FAMU-CESTA

Dr. Samuel L. Donald
Interim Dean and Director Land Grant Programs, FAMU-CESTA

Checking the Westward March of the Cactus Moth

Center researchers and their collaborators are making excellent progress towards checking the westward spread of the invasive cactus moth, *Cactoblastis cactorum* to areas of high cactus diversity or where cacti are an important crop...(contd. on pg 6)

The Center Launches its First Lucid Based Digital Identification Tool

At a time when more taxonomists are needed to support biological control, biodiversity conservation efforts and new requirements for international trade, the discipline continues to decline. New tools to facilitate identification of organisms are therefore needed, and computer based decision support tools offer a unique solution by capturing knowledge resident in the diminishing number of taxonomists or in complex print based dichotomous keys in a simple and easy to use macromedia format. These tools utilize high definition images and can include extensive background information. Interest in this new direction has been spurred in part through development of user friendly macromedia matrix-based interactive keys, especially Lucid which was developed by the University of Queensland (Australia). Using this platform, scientists at the Center recently launched a Lucid-based key for the identification of weevils used in the biological control of terrestrial and aquatic weeds in North America. This tool was developed by Drs. Muhammad Haseeb, Charles O'Brien, Wills Flowers and Moses Kairo and is freely available on the internet (www.famu.org/weeviltool). Center scientists are now developing similar tools for other taxa. Support for the development of this Lucid-based key was provided in part by USDA-APHIS.



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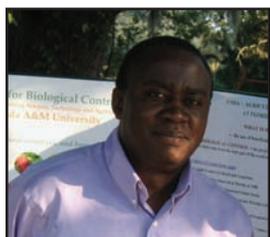
Editor: Dr. Moses T.K. Kairo
Moses.Kairo@FAMU.EDU

Contact Details

FAMU:
Tel. (850) 412-7059-62
Fax. (850) 412-7263

USDA-ARS:
Tel. (850) 656-9870
Fax. (850) 656-9808

A Year of Change and Achievement



Dr. Moses T.K. Kairo,
Center Director

Eighteen months have elapsed since we began implementing our new strategic plan (2006-2010), and based on the prognosis from a recent Advisory Committee meeting, we are generally doing well, thanks to the dedicated faculty and staff. During the last year, the Center welcomed two new members, Dr. Raymond Hix, Assistant Professor, and Dr. Susan Bambo, a Postdoctoral Fellow. This

welcome addition increases the Center's capacity to deliver on its mission:

To generate, apply and transfer innovative, ecologically based solutions to pest problems affecting agriculture, natural resources, and human health while developing the human capacity for continued future innovation.

The Center's research program is vibrant and growing with three new projects and several grant proposals in the works. In August 2006, USDA-ARS and FAMU signed a new Specific Cooperative Agreement (SCA) focused on synergizing collaborative work. The objective of this SCA is to develop and improve biologically-based technologies used for the area-wide control of disease-vectoring thrips and migratory Lepidoptera (see story pg. 5). Another new project funded by APHIS looks at issues related to the risk analysis process during the introduction of entomophagous biological control agents (pg. 7). A new project to evaluate control of the grape root borer, a major pest of grape using nematodes has also been initiated with support from the Florida Department of Agriculture and Consumer Services' Viticulture Advisory Council (pg. 8).



Dr. Stuart R. Reitz, Co-director

Two M.S. students completed their research and three PhD students are making excellent progress in their studies. The Center also continued to offer undergraduate student internships with at least eight students participating during the last year. The establishment of a minor in regulatory science was an important milestone which builds on excellent linkages between FAMU and APHIS Center for Plant Health Science, North Carolina State University and University of Florida. With an active research program, the Center is set to accommodate more students and to this end we have embarked on an aggressive recruitment effort. We anticipate that two M.S. student will be joining the Center shortly and expect a few more by December.

The Center was involved in various extension and outreach activities during the year. A training course on use of Lucid keys for insect identification was organized in Tallahassee in collaboration with USDA-APHIS (pg. 11). Other activities included participation in field and outreach days. Faculty and students also participated in a range of regional, national and international scientific meetings.

With all that is happening, we have good reason to look into the future with excitement and enthusiasm. We are extremely grateful to our various partners and funding agencies especially ARS and APHIS, and look forward to another productive year.

Key Outcomes from the April 2007 Center Advisory Committee Meeting

Among the key recommendations and conclusions from the Center Advisory Committee meeting chaired by Dr. Norm Leppla and attended by Dr. Ken Bloem (APHIS), Mr. Ed Burns and Ms. Abbie Fox (FDACS), Dr. John Sivinski (ARS), Ms. Ann Wildmann (APHIS); FAMU Ex Officio Members: Dr. Makola Abdullah, Dr. Samuel Donald and Dr. Sunil Pancholy and Center Faculty were the following:

- Expand the Advisory Committee to ensure full participation by the wider group of Center stakeholders. This may include representation from the environmental community, farmer groups and other stakeholder groups who could champion the Center.
- Promote the Center's activities with relevant agencies, at the state, federal and international levels, such as APHIS, National Plant Board and other organizations, and especially inform them about the importance of the Center's research.
- Broaden the Center's resource base. Specific efforts should be made to seek assistance in advancing the Center's resource base and increasing its capabilities.
- Develop position descriptions for the projected future faculty expansion.
- Increase the number of training and other outreach events sponsored by the Center, particularly those of importance to specific stakeholders.
- Continue to partner with other FAMU departments and outside organizations to develop grant proposals, conduct joint projects, recruit and exchange students, etc.
- Develop a process for establishing priorities to keep the Center activities focused on the needs of specific clientele, including regular meetings of FAMU, ARS and APHIS personnel stationed in Tallahassee.
- Continue to increase international activities that are central to the objectives of the Center.
- Maintain the impressive productivity of the Center and its outstanding leadership.
- In view of the range of activities at the Center, there may be a need to assess and possibly change the name of the Center to be more reflective of its activities. The current name focuses on biological control, yet the Center's activities and projected growth areas go beyond the traditional narrow focus of this.

New Member Joins the Advisory Committee



Mr. Joshua Craft

We are delighted that Mr. Joshua Craft, Assistant Director of the Agricultural Policy Division at Florida Farm Bureau Federation has accepted to join the Center Advisory Committee. Mr. Craft is responsible for aquaculture, vegetable and sod and the respective advisory committees as well as being the point person for pesticides and food safety. He is a graduate of the University of Florida with a bachelor's degree in business administration and a master's degree in agribusiness.

People in the News

Making History – FAMU Team Competes in the Linnaean Games in Knoxville, Tennessee

Entomology graduate students attended the Southeastern Branch (SEB) of the Entomological Society of America (ESA) Meeting March 4-7 2007 in Knoxville Tennessee and competed in the Linnaean Games. The team consisted of Mr. Kirphton Fray (M.S. student) and three Ph.D students: Mr. Antonio Francis, Ms. Oulimathe Paraiso and Mr. Rafael Abanja. The team was coached by Dr. Raymond Hix. Teams from ten universities competed in the 24th Annual SEB Linnaean Games but this was the first time an 1890's school had participated at the SEB or indeed any of the 5 branches of the ESA. The ESA Linnaean games are a lively question-and-answer, college bowl-style competition on entomological facts where teams of four individuals face each other in knockout sessions. The winning and runner-up teams from each of the five ESA branches go on to the national competition held at the annual ESA meeting. FAMU competed with University of Florida in a game that went down to the last toss up question, but lost. However, our team demonstrated that they are competitive and capable of winning. Indeed, the team is already looking forward to next year's competition in Jacksonville, Florida!



FAMU Linnaean Team

New Faculty



Dr. Raymond Hix

Dr. Raymond Hix, joined the Center in November following a transfer from the Center for Viticulture and Small Fruits Research. Dr Hix joined FAMU in 2004 and has been involved in work on glassy-winged sharpshooter. His background is in insect behavior and IPM of grapes, fruit and rice. His responsibilities will include invasive species biology and biological control of weeds and pests of perennial crops. The transfer of Dr. Hix increases the capacity at the Center and is expected to strengthen the entomology program including the cooperative Ph.D program with the University of Florida.



Dr. Susan Bambo

Dr. Susan Bambo, joined the Center as a Postdoctoral Researcher working with Dr. Oghenekome Onokpise on biological control of cogongrass. Dr. Bambo obtained her B.Sc. at Ahmadu Bello University Zaria, Nigeria in 1995. This was followed by a M.Sc. in forest resources and management from the University of Ibadan in 2000.

She Obtained her doctoral degree in the School of Forest Resources and Conservation at the University of Florida in 2006. Her dissertation topic: *Tree - Forage Interactions in Silvopastoral Systems: Forage Performance under Thinned Loblolly Pine Stands in North Florida.*

Training News

Development of a minor in regulatory plant science

An important development during the year was the development of a minor in regulatory science at FAMU. A keystone course to underpin this minor has been developed by APHIS. This will be delivered by video conference by the APHIS training specialist, Dr. Stephanie Bloem based at the Center for Plant Health Science and Technology in Raleigh. This course has been made possible through excellent collaborative linkages between FAMU, APHIS and North Carolina State University.

Staff Professional Development

Baez, I. Computer software courses in (Word Level 2 (June 15-16, 2006) and Word Level 3 (June 26-27, 2006). Computer Tutors, Inc., Tallahassee, FL.

Baez, I. Plant Pathology Distance Learning, Department of Plant Pathology, IFAS, University of Florida, Gainesville, FL, August-December, 2006

Haseeb, M. USDA-CSREES Grantsmanship Workshop. 2006. Organized by the United States Department of Agriculture – Cooperative State Research, Education, and Extension in Cooperation with the Oklahoma State University, held in Dallas Fort Worth/Grapevine, Texas (17-18 October 2006).

Legaspi, J.C. Executive Supervisory Skills, Eastern Management Development Center, Shepherdstown, WV, July 10-14, 2006

Legaspi, J.C. Computer software courses (Word Level 2 (June 15 & 16, 2006) and Word Level 3 (June 26 & 27, 2006); Excel Level 1 (Aug. 28 & 29, 2006), Computer Tutors, Inc, Tallahassee, FL

Student Awards



Mr. Tajudeen (Tayo) Salaudeen, M.S. in Agricultural Sciences (Agribusiness); graduated in fall 2006; Major Advisor: Dr. Michael Thomas; Thesis: Economic impact of tropical soda apple on cattle production in Florida.



The Entomology Club was voted the most improved club in CESTA. On hand to receive the award from the Interim Dean, Dr. Samuel Donald were Mr. Kirpton Fray, Mr. Raphael Abanja and Ms. Oulimathe Paraiso.



Ms. Janice G. Peters M.S. Student, Most outstanding graduate student (GPA of 4.0)



Ms. Shalom C. Sierbert B.S. Student, Deans List award (GPA 3.5 and above).



Mr. Kirpton Fray, M.S. Student leadership award.

Mr. Keith Marshall, B.S. entomology student, completed an internship under the Summer Research Program at Purdue University, West Lafayette, Indiana. He worked with Dr. Linda Mason at the Department of Entomology. This program provides research experience including preparing and presenting research findings, mentoring relationship, workshops on GRE test taking skills, meeting fellow undergraduates from around the U.S., and opportunities to learn about careers in academia and industry.



Mr. Kirpton Fray, M.S. in Agricultural Sciences (Entomology); graduated in spring, 2007; Major Advisor: Dr. Lambert H.B. Kanga; Thesis: The use of fungal pathogens to control the glassy winged sharpshooter, *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae).



Dr. Lambert Kanga, extreme left and Mr. Grant Capelouto (center) with 2006 recipients of the Capelouto Foundation Scholarships (from left), Mr. Keith Marshall, Mr. Raphael Abanja and Ms. Shawana Henderson

Research Reports

Does Secondary Plant Metabolism Provide Induced Plant Defenses in Tropical Soda Apple?

Insect herbivory and infection by viruses, bacteria and fungi can have effects on both the plant and the attacker by initiating secondary plant metabolism that turn on plant defenses known as induced (against insects) resistance and systemically acquired defenses (against diseases). For example, tomato plants respond to herbivory by producing chemical inhibitors that reduce the palatability and nutritional quality of the plant. These induced defense proteins can reduce insect fitness, preference, and nutritional value as well as increase mortality. These systems have been studied in nightshades such as tomato, but little work

Spodoptera eridania feeding on TSA



has been done on nightshades considered as weeds. The present study, which is spearheaded by Dr. Raymond Hix, was initiated this spring in collaboration with Drs. Stuart Reitz and Moses Kairo on the invasive noxious weed tropical soda apple (TSA) *Solanum viarum*. As a pasture weed, TSA creates problems for live stock operations, it is also a potential reservoir for tomato spotted wilt virus that can be vectored to tomato by the western flower thrips and relatives. This virus is one of the most economically important challenges in commercial tomato production in Florida. Plants in which defenses have been induced may be less suitable for generalist herbivores such as thrips. Studies with the TSA herbivore specialists *Gratiana boliviana* and/or *G. graminea* to study induced resistance in tropical soda apple a relative of tomato, and evaluate the possible effects on western flower thrips performance. [Funding: USDA-ARS]

All the Buzz about Bees

Recent years have seen increased concerns about the declining population of honey bees including a congressional hearing. The ectoparasite, *Varroa* mite is the major pest of honey bees and research led by Dr. Lambert Kanga in collaboration with Dr. Walker Jones (USDA, ARS), Mr. Carlos Garcia (USDA ARS) and Dr. John Cascino (Sylan BioProducts), has demonstrated the use of the fungus *Metarhizium* to control *Varroa* mite populations in bee colonies. Current efforts are tailored on enhancing stability, persistence of fungal spores, and mass production of the fungal products.



Ether rolls and evaluations of the strength of honey bee colonies by Dr. Kanga's research team in Weslaco, TX

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The Minute Pirate Bug's Role in Limiting Thrips Populations

Frankliniella flower thrips are key pests of many vegetable crops, including peppers and because chemical pesticides are not an effective strategy for controlling these pests there has been much interest to develop biological control. In collaboration with scientists from the University of Florida (Drs. Joe Funderburk, Tim Momol and Steve Olson), Center researchers (Dr. Stuart Reitz) have demonstrated the capacity of the minute pirate bug *Orius insidiosus* to prey on different species of thrips and that it can be an effective biological control agent in field grown crops. They have also shown how naturally occurring populations of this predator can be conserved and integrated into pepper production systems. This research has led pepper growers to reduce broad-spectrum insecticide use and to place a greater reliance on naturally occurring populations of insect predators. [Funding: USDA-ARS and USDA-CSREES-T-STAR]

The Minute Pirate Bug feeding on a Thrip Larva



Ecuador – Continued Enhancement of the Entomology Capacity

The Center continued its participation in collaborative project led by Virginia Tech. A week-long workshop on insect identification was provided by Dr. Wills Flowers to over 20 people, divided evenly between professional agronomists and entomology students from regional universities. This was a repeat of a class given two years earlier due to popular demand. Discussions were also held with



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Dra. Carmen Suarez and Ing. Danilo Vera of the INIAP-Pichilingue research station about future IPM work. Work will continue on cacao-plantain agroecosystems and in particular on risk assessment of the use of *Beauveria bassiana* against the black banana weevil in plantain. [Funding: USAID (Through Virginia Tech University)]

Dr. Flowers and Trainees in Ecuador



Checking the Westward March of the Cactus Moth

A concerted effort by researchers at the Center (Drs. Stephen Hight and Jesusa Legaspi) and their collaborators (Dr. James Carpenter, USDA-ARS, CPMRU, Tifton, GA, and Drs. Bob Heath and Nancy Epsky, USDA-ARS, SHRS, Miami, FL.) has achieved great progress towards halting the westward spread of the invasive cactus moth (*Cactoblastis cactorum*) into areas of high cactus biodiversity and areas where



Dr. Stephen Hight transferring trapping technology to Mexican counterparts on Isla Mujeres

cactus is an important agricultural, horticultural, and cultural plant. Validation of the Sterile Insect Technique (SIT) program has identified substantial reduction in population levels of the moth when sterile moths are released in combination with sanitation efforts. This control technology is being pursued by USDA-APHIS, in collaboration with the Mexican Government, as both an area-wide control measure and an eradication technique for isolated outbreaks of the invasive cactus moth. In another research thrust, an efficient trapping system, based on a female sex pheromone that was identified by the team is now in use to determine the spread and distribution of the moth. This trap design and synthetic female sex pheromone has been 100% adopted by USDA-APHIS and the Mexican Government as the *C. cactorum* detection device. The pheromone lure has also

been developed as a new commercial product. APHIS Pest Survey Specialists and Department of Interior land managers (U.S. Fish and Wildlife Service, National Park Service, and Biological Resources Division of USGS)

across the southern U.S. are using this trap design to monitor the spread of *C. cactorum*. As part of the research effort, scientists have also constructed a laboratory based life table for the moth. This information will be useful in determining seasonal dynamics of the cactus moth in the field, which will benefit future management programs based on the sterile insect technique and biological control. Scientists at the Center are also assisting Mexican scientists to eradicate the cactus moth following its unexpected appearance in Isla Mujeres, Mexico during 2006.



Ms. Aninakwa collecting pheromone traps

Biodiversity Monitoring in Ecuador



A spectacular view of the Rio Chimbo watershed in Bolivar Province, Ecuador

The entire team of collaborators under the Sustainable Agriculture and Natural Resource Management, Collaborative Research Support Program (from FAMU, Virginia Tech, INIAP, EcoCiencia and local community representatives) made the first visit to

the project site in Bolivar Province, Ecuador. The SANREM activities will include soils, social action, and biodiversity monitoring. FAMU's involvement is in the latter activity along with a group of people from EcoCiencia, an Ecuadorian NGO dedicated to environmental studies and protection. The research will include monitoring several streams in communities where other components of the SANREM project are active. In June 2007, Ms Shalom C. Siebert (B.S. Entomology Student) spent a month as an intern during which time she assisted the biomonitoring team with field sampling and laboratory identification. Shalom also visited the Pichilingue field station and the IPM-CRSP project. [Funding source: USAID-EGAT]

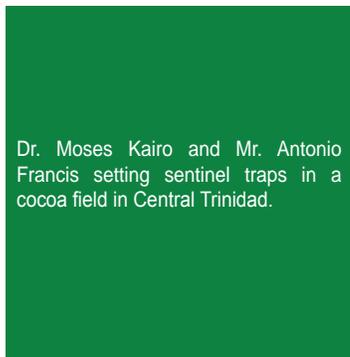
The Fight Against Invasive Species Continues

Mr. Antonio Francis (Ph. D. Student) is in Trinidad again to conduct research on *Planococcus minor*, one of the high risk species considered as a major threat in the United States and other Caribbean countries. The research is focused in



Mr. Antonio Francis sampling mealybugs in Trinidad

quantifying basic biology and ecology of the species. This work is supported by USDA-APHIS and is being undertaken in collaboration with Dr. Amy Roda (APHIS-PPQ-CPHST, Miami) and Mr. Russell Duncan (APHIS-IS, Dominican Republic). The Center also continued its active role in the Caribbean Invasive Species Working Group. In particular, the Center is actively involved in the CABI led project: 'Mitigating the Threats of Invasive Alien Species in the Insular Caribbean.' To this end, Dr. Kairo participated in the final meeting at the end of the project development phase whose focus was developing a detailed proposal for funding through the Global Environment Facility. This is a strategically important project focused on strengthening the capacity of participating countries, and thus has significant implications on the regional safeguarding efforts.



Dr. Moses Kairo and Mr. Antonio Francis setting sentinel traps in a cocoa field in Central Trinidad.



Getting to the roots of the problem: New approaches to cogongrass control

Millions of dollars are spent annually in suppression and control costs for the highly invasive cogongrass, *Imperata cylindrica* using herbicidal and mechanical approaches with very limited success. Ongoing studies led by Dr. Oghenekome Onokpise, are evaluating control of cogongrass through competitive displacement using three Florida native grass species: Switchgrass (*Panicum virgatum*), "Citrus" Maidencane (*Panicum hemitomon*), Muhlygrass [*Muhlenbergia capillaris*], and one legume species, lupine (*Lupinus diffusus*). Preliminary data from greenhouse pot experiments show that both switchgrass and muhlygrass grew dense clumps with tillers/stems being produced near



The native fine textured hairawn muhly grass, forefront, and invasive wider bladed cogongrass in the background

the main stem.

Cogongrass

and maidencane were rhizomatous and spread substantially by rhizomes. The root system of maidencane was able to colonize a majority of the soil in the pot by the end of 6 weeks thus restricting in some degree the spread of cogongrass root system. The rhizome of both maidencane and cogongrass spread through the root systems of the other grasses and legume. The root system of all grasses and the one legume intermingled and did not appear to be adversely affected by this contact. The vigorous rhizomatous nature of maidencane indicates a potential competitive advantage to cogongrass. Field studies are planned for 2007 and 2008 growing seasons. [Funding Source: USDA CSREES]

An Expedition to the Madre de Dios River Basin, Peru

In August 2006, Dr. Wills Flowers was part of an 18 day expedition which set out to assess the watershed health in the Madre de Dios river Basin of Peru. The expedition was organized by the Stroud Water Research Center and comprised of twelve members including scientists and educators. The goals of the expedition were to: (1) establish a baseline of scientific data on water quality, stream biodiversity, and stream health that would serve as the foundation for understanding and sustaining on-going conservation efforts in the region; and (2) create, test, and implement accessible, easy-to-use, and inexpensive education programs for the people of the region. A detailed report has been produced and is available at the following link: http://www.stroudcenter.org/research/MooreFdnPeru/PDFs/A6_Macros_19jan07_final.pdf. In October 2006, Dr. Flowers together with scientific and education staff members of the Stroud Center returned to Madre de Dios to offer training workshops on water-quality monitoring and the ecology of streams and rivers to a range of key stakeholders.

[Funding Source: Gordon and Betty Moore Foundation]



Dr. Flowers and collaborators sampling in a stream in the Madre de Dios watershed, Peru.

Communicating risks during classical introductions of entomophagous agents

The introduction of natural enemies for classical biological control is an important approach to the management of invasive species. It can also be an important component of IPM programs. Furthermore, there is also a growing demand especially by industry to introduce biological control agents for augmentation biological control. However, recent years

have seen increased concerns about the potential negative effects of introduced biological control agents. Indeed one of the projects at the Center (Cactus moth) is looking at a biological control agent whose unexpected spread into new localities is causing problems. This new project funded by APHIS seeks to: test and adapt existing protocols for risk analysis with a view to streamline and surmount existing bottlenecks. Components of the project are being implemented by Ms. Paraiso as part of her Ph.D. research under the co-major professors, Dr. Moses Kairo and Dr. Stephanie Bloem, APHIS-PPQ-CPHST. Her first order of business is to understand how risks are communicated during the process and their implications.



Ms. Ouilmathe Paraiso, Ph.D. student (left) receives a certificate of accomplishment from Dr. Ron Sequeira following participation in the pest risk analysis workshop during her internship at USDA-APHIS-CPHST in Raleigh, NC. Looking on are Drs. Christina Devoshark and Robert Griffin of CPHST.

Economic Impact of Tropical Soda Apple on Florida Cattle Industry

Tropical Soda Apple (TSA), an invasive plant from South America, is a commonly occurring weed afflicting beef producers in Florida. As part of a project funded by APHIS, research by FAMU Master's student Tajuden 'Tayo' Salaudeen (major professor Dr. Michael Thomas) has shown that TSA is ranked by cattle producers as the most common pasture weed across Florida. Moreover, in the central and southern regions of the state over 80% of the survey respondents reported having TSA on their ranches and over 65% declared it a major pest problem. While the level of actual infestation is relatively low, ranging from about 3% in north Florida to a high of 12% in central Florida, the potential risk in the northern and panhandle parts of Florida is high. To control the weed, ranchers are forced to chemically and/or mechanically treat significant areas of their pastures at a cost of approximately \$25 and \$19 per acre in chemical and mechanical control respectively. When these figures are applied to all commercial pastureland, the economic impact to cattle producers and their supporting industries is significant, with a statewide economic impact ranging from approximately \$6.5- \$16 million annually.



A dense tropical soda apple bush

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Biological Control of Grape Root Borer in Florida Grapes Using Entomopathogenic Nematodes

The grape root borer, *Vitacea polistiformis* (Lepidoptera: Sessidae), is a major pest of grape in the east. It hasn't received much attention since it doesn't occur in California or Oregon where the vast majority of grapes are grown in the US. With the imminent loss of Lorsban the only insecticide registered for use on grape to control any stage of this insect, this project was initiated to evaluate the use of endemic insect parasitic nematodes for the biological control of this grape pest in Florida. Researchers in Ohio evaluated 17 species of nematodes and determined that two were effective for the biological control of the GRB including *Heterorhabditis zealandica* and *H. bacteriophora*. *H. bacteriophora* and *H. megidis* were chosen because they are currently endemic to Florida and commercially available in Florida. Currently, *H. zealandica* is only available commercially from Australia. The objectives of this study are to: 1) evaluate the efficacy of *H. bacteriophora* and *H. megidis* as a biological control agent of the GRB; and 2) evaluate the number of *H. bacteriophora* and *H. megidis* that are required for adequate control. [Funding source: Florida Department of Agriculture and Consumer Services' Viticulture Advisory Council]



Larva of graperoot borer

Researchers in Ohio evaluated 17 species of nematodes and determined that two were effective for the biological control of the GRB including *Heterorhabditis zealandica* and *H. bacteriophora*. *H. bacteriophora* and *H. megidis* were chosen because they are currently endemic to Florida and commercially available in Florida. Currently, *H. zealandica* is only available commercially from Australia. The objectives of this study are to: 1) evaluate the efficacy of *H. bacteriophora* and *H. megidis* as a biological control agent of the GRB; and 2) evaluate the number of *H. bacteriophora* and *H. megidis* that are required for adequate control. [Funding source: Florida Department of Agriculture and Consumer Services' Viticulture Advisory Council]

Exploring the Potential of Mycopathogens Against the Cactus Moth



Dr. Kanga working with Mr. Ignacio Baez and Ms. Elizabeth Aninakwa

Centers researchers, Drs. Jesusa C. Legaspi and Lambert Kanga are evaluating the pathogenicity and virulence of several fungal pathogens. This will provide useful insights in developing an integrated pest management strategy against the cactus moth, *Cactoblastis cactorum*. On-going laboratory bioassays include testing the entomopathogens, *Paecilomyces fumosoroseus*, *Metarhizium anisopliae* and *Beauveria bassiana* against immatures of the cactus moth. Additional fungal strains such as *Metarhizium flavoridae*, *Beauveria amorphous*, *Paecilomyces farinosus* and *Verticillium lecanii* will be tested. Another objective of this research involves collecting dead cactus moth during fungal epizootics in field conditions. Any primary causal fungal pathogen will be isolated, identified and cultured. An additional goal will be to develop techniques to improve pathogenicity and virulence of promising fungal pathogens of the cactus moth. [Funding Source: USDA ARS]

Getting to know each other



Entomology students and faculty

Management of Putative Insecticide Resistance in Glassy Wing Sharpshooter Populations

As part of his graduate research, Mr. Raphael Abanja (Ph.D. student) is currently working under Dr. Lambert Kanga to investigate insecticide tolerance allele frequencies in the grassy winged sharpshooter, *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) populations across the grape growing regions of the United States. The main objective is to determine the mechanisms of resistance to insecticides and to characterize the genetic profiles of resistant strains of the sharpshooter.

Publications

Adkins, S., Momol, M. T., Dankers, H., Reitz, S., and Olson, S. 2006. First report of *Tomato spotted wilt virus* in tomatillo in Florida. Online. Plant Health Progress doi:10.1094/PHP-2006-0607-03-BR.

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Shapiro, J. and J. C. Legaspi. 2006. Assessing biochemical fitness of predator *Podisus maculiventris* (Heteroptera: Pentatomidae) in relation to food quality: effects of five species of prey. Annals of the Entomological Society of America. 99(2): 321-326.

Simmons, A. M. and J. C. Legaspi. 2007. Ability of *Delphastus catalinae* (Coleoptera: Coccinellidae), a predator of whiteflies (Homoptera: Aleyrodidae), to survive mild winters. Journal of Entomological Science. 42(2): 163-173.

Extension and Outreach Activities

CBC at the 89th Annual Meeting of the Florida Entomological Society, Jupiter, FL, July 23-26, 2006

Kairo, M.T.K., A. Francis and M. Haseeb. 2006. Taking the war against invasive species offshore.

Legaspi, J. C., M. Jervis and B. C. Legaspi, Jr. Ovipigeny in selected generalist predators.

Sims, K.R., Funderburk, J.E., Reitz, S.R. and Boucias, D. *Thripinema fuscum* (Tylenchida: Allantonematidae) parasitism reduces both the feeding of *Frankliniella fusca* (Thysanoptera: Thripidae) on peanut and the transmission of Tomato spotted wilt virus.

CBC at the 54th Annual Meeting of the Entomological Society of America, December 11, 2006, Indianapolis, Indiana.

Symposia Organized

Kairo, M.T.K., Ochieng, S., Barbosa, P., Fadamiro, H., Liburd, O., Edde, P., Opit G. and Favi, F.: Regular Symposium: From Entomological Plagues to Biodiversity: Unfinished Business in Africa. A Tribute to the Life of Professor Thomas R. Odhiambo (1931-2003).

Reitz, S.R. and Nault, B.: Section F Symposium: Ecology and Management of Insect Vectors of Plant Pathogens in Vegetable Crops.

CBC at 81st Annual Meeting of the Southeastern Branch Entomological Society of America (March 4-7, 2007), Knoxville, TN:

Abanja, R.N. and Kanga, L.H.B. Monitoring for insecticide resistance in the glassywinged sharpshooter, *Homalodisca coagulata* (Say), in southeastern United States.

Francis, A. and Kairo, M.T.K. *Planococcus minor* (Maskell): Solving the identity crisis.

Fray, K. and Kanga, L. Control of the Glassy-winged sharpshooter, *Homalodisca coagulata* (Homoptera: Cicadellidae) with entomopathogenic fungi.

Paraiso, O., Kairo, M.T.K. and Bloem, S. Biological control permitting process and risk communication.

Faculty, Collaborator, Student Presentations and Posters

Haseeb, M., and M.T.K. Kairo. 2006. New possibilities for the management of the southern green stink bug, *Nezara viridula* (L.) [Heteroptera: Pentatomidae].

Kairo, M.T.K., Polar, P. and Moore, D. Fungal pathogens against ticks: Is the cattle skin surface too hostile.

Legaspi, J. C., M. Jervis and B. C. Legaspi, Jr. Ovipigeny in elected generalist predators.

Reitz, S.R. and Funderburk, J.: Impact of natural enemies on thrips and *tomato spotted wilt virus*.

Simmons, A. and J. C. Legaspi. Immature *Delphastus catalinae*: influence of relative humidity on survival.

Sims, K.R., Funderburk, J.E., Reitz, S.R. and Boucias, D. *Thripinema fuscum* (Tylenchida: Allantonematidae) parasitism reduces both the feeding of *Frankliniella fusca* (Thysanoptera: Thripidae) on peanut and the transmission of *Tomato spotted wilt virus*.



Dr. Legaspi addressing participants at the viticulture field day

Viticulture Field Day

Future entomologist take a keen interest in the entomology display



CESTA Career Fair

Dr. Raymond Hix and Mr. George Marshall from CBC speak with students at the CESTA Career Fair

Undergraduate students, Elizabeth Aninakwa and Shawanna Henderson presented insect displays and brochures to Swift Creek Middle School students, FAMU Reach Out Day, May 2 and May 9, 2007.

Shawanna Henderson presented insect displays and information to local 3rd and 4th-grade 4-H students, Leon County Extension Office, Tallahassee, FL, May 11, 2007; K-2nd-grade students at the summer camp program, Tallahassee Museum of History and Natural Science, May 31, 2007 and to high school students in the RATTLER summer camp program, FAMU, June 22, 2007.

Graduate students, Kirphton Fray, Oulimathe Paraiso and Raphael Abanja presented insect displays and brochures at the Monarch Butterfly Festival, St. Marks National Wildlife refuge, St. Marks, FL, October 28, 2006.

“Making the Most out of Lucid® Identification Tools”



Participants at the lucid workshop held at FAMU on May 9, 2007

Efforts to develop Lucid based platforms has been ongoing at FAMU since 2004 with support from USDA, APHIS. As an extension of this work, a workshop entitled “Making the Most out of Lucid® Identification Tools” was organized in Tallahassee in partnership with USDA, APHIS, PPQ, CPHST on May 9, 2007. The purpose of the workshop was to provide training on best practices for accessing and using available Lucid identification tools. A total of 13 participants were trained. The key resource persons for the workshop were Dr. Terrence Walter (Coordinator Lucid, USDA, PPQ, Fort Collins, Colorado) and

Dr. Julie Scher (USDA, PPQ, Sacramento, California). The main topics covered included: Introduction to Lucid Software and Tools, Group Identification Practice, Best Practices for Using Lucid Identification Tools, Individual Identification Practices and Further Options for Using Lucid Identification Tools. A workshop manual was provided to each participant.



Dr. Terrence Walters (APHIS) delivers a lecture during the lucid workshop held at FAMU on May 9, 2007

Other Conference Presentations, Extension and Outreach Seminars and Activities

Baez, I. “Successful partnerships between USDA and 1890’s Universities – the FAMU, APHIS and ARS Center for Biological Control in Tallahassee, FL”, Invited speaker at the USDA, APHIS, PPQ, CPHST, Plant Epidemiology and Risk Analysis Laboratory, Raleigh, NC, March 29, 2007.

Haseeb, M. CESTA Career Fair. 2007. Sponsored and organized by the CESTA, FAMU held on January 24-25, 2007, Tallahassee, FL.

Haseeb, M. Flowers, R.W. Kairo, M.T.K. Development of Expert Information Systems for Priority Invasive Taxa. Presented at the Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Gainesville, Florida, USA. (11 January, 2006).

Hight, S. D. Research Goals and Progress Updates. APHIS *Cactoblastis* Operational Planning Meeting, Pensacola, FL, June 22, 2006.

Hix R.L. Alternative grape root borer control strategies. Grape Grower Field Day. Viticulture and Small Fruits Research Center 6505 Mahan Drive, Tallahassee, FL 32317 June 14, 2006.

Hix R.L. Demonstration of insect growth regulators for fire ant management in vineyards. Grape Grower Field Day FAMU Viticulture and Small Fruits Research Center 6505 Mahan Drive, Tallahassee, FL 32317 June 14, 2006.

Hix R.L. Pierce’s Disease in California. In-service training and workshop *Xylella fastidiosa*: a pathogen of grapevines and a potential problem for the citrus industry in Florida. North Florida Research and Education Center, University of Florida/IFAS 155 Research Road - Quincy, FL, 32351 May 24, 2006.

Hix R.L. Using the 2006 Florida grape spray guide. Florida Grape Grower’s Association Meeting, January 2006, Ocala, FL.

Kairo, M.T.K. 2007. Potential for partnership towards mitigation of the threats posed by invasive alien species in the insular Caribbean. International stakeholder planning workshop ‘Mitigating The Threats of Invasive Alien Species in the Insular Caribbean (PDF A), Hotel Cascadia, St. Anns, Port of Spain, Trinidad, 22-26 January 2007

Kairo, M.T.K. and Leppla, N. Cooperation in IPM between Florida A&M University and University of Florida. Presentation to the 1890 Agricultural Extension Administrators meeting (Lexington, Kentucky; June 22, 2007) and Forum for 1862 and 1890 Land Grant IPM Programs (Indianapolis, Indiana; September 11-12, 2007)

Legaspi, J. C., A. M. Simmons and B. C. Legaspi, Jr. 2006. Life history of *Delphastus catalinae*: a predator of *Bemisia tabaci*. p. 118. Proceedings of the 4th International *Bemisia* Workshop, Duck Key, FL, Dec. 3-6, 2006.

Liu, T.-X., G.M. Liang, Y.Y. Xu, M. Haseeb, and W. Chen. 2007. Adoption of integrated management strategies for diamondback moth and other crucifer insect pests in Texas. Paper presented at the 5th International Workshop on the Management of the Diamondback Moth and Other Crucifer Pests, held in Beijing, China (24-27 October 2006).

Legaspi, J.C. Life table analysis for *Cactoblastis cactorum* immatures and female adults under five constant temperatures. International *Cactoblastis cactorum* conference. Phoenix, AZ, May 8-10, 2007.

Reitz, S.R. A new age approach for management of tomato spotted wilt on tomatoes? Florida Phytopathological Society, Quincy, FL. May 2007.

Reitz, S.R. Do Little Differences in Little Things Matter? The Behavioral Ecology and Management of Thrips. USDA-CMAVE, Gainesville, FL. February 2006.

Reitz, S.R. Tospoviruses – Vector Species, Plant Hosts, and Diagnostics. Thrips Sampling and Identification Workshop. University of Florida, Gainesville, FL. March 2006.

Reitz, S.R., Maiorino, G., Ritchie, L., Olson, S., Sprenkel, R. Crescenzi, A. and Momol. M.T. Plant Essential Oils and Particle Films for the Management of Tomato Spotted Wilt on Tomatoes. American Phytopathological Society, Quebec, QC. Phytopathology 96: S97

Reitz, S.R., Maiorino, G., Ritchie, L., Olson, S., Sprenkel, R. Crescenzi, A. and Momol. M.T. New Approaches for the Management of Tomato Spotted Wilt on tomatoes with Plant Essential Oils and Particle Films. 37th International Symposium of Essential Oils. Grasse, France.

FAMU Reach Out Day



Ms. Shawana Henderson demonstrating the life and time of insects to Swift Creek Middle School students

Student Opportunities

Graduate:

The CBC has opportunities for students interested in entomology M.S. and Ph.D. studies. The Ph.D. in entomology is offered cooperatively with the Entomology and Nematology Department of the University of Florida.

Undergraduate:

The Center also has scholarship and internship opportunities for undergraduate students.

Contact:

Interested students may write to Dr. Moses T.K. Kairo (Moses.Kairo@FAMU.EDU) or Dr. Lambert Kanga (Lambert.Kanga@FAMU.EDU).



Website Links:

FAMU: <http://www.famu.edu/index.cfm?a=cesta&p=CenterforBiologicalControl>

USDA-ARS: http://www.ars.usda.gov/Main/site_main.htm?docid=3014

Securing Food, Natural Resources and Human Health

Center for Biological Control
Florida A&M University
310 Perry-Paige Building
Tallahassee, FL 32307-4100