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T-STAR INITIATIVES IN SUPPORT OF INVASIVE SPECIES EFFORTS IN THE GREATER CARIBBEAN REGION

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ABSTRACT. The T-STAR program supports basic and applied research on invasive species with respect to (i) their biology, ecology, (ii) methods of diagnosis/identification, detection, surveillance, exclusion, eradication and control and (iii) development of comprehensive safeguarding strategies, including international policy development and coordination among all countries and territories, and the use of internet-based communications to facilitate all aspects of a coordinated Regional system to prevent and mitigate invasive species impacts. Currently significant emphasis is on building technical and institutional policy support platforms for an effective US/Caribbean Basin Invasive Species Safeguarding System.
A brief history of the T-STAR program is presented including the actions taken by various scientists and administrators to arrive at the invasive species program in the Greater Caribbean Region. A list of invasive species research projects currently funded by T-STAR is included.

INTRODUCTION

The T-STAR program (Tropical & Subtropical Agriculture Research) is part of the Special Grant Program of the USDA-CSREES and it has been funded for more than 25 years under Public Law 89-106. T-STAR is a collaboration and partnership currently with a priority focus on invasive species and at the University of Florida it is currently headed by Dr. Douglas L. Archer. The T-STAR program has extensive partnerships in the Caribbean through the Caribbean Invasive Species Working Group, which includes CARDI, CARICOM Secretariat, CABI, CIRAD, France - Service de la Protection des Végétaux, Direction de l'Agriculture et de la Forêt, Costa Rica Ministry of Agriculture, FAO, PAHO, IDIAF, IICA, UPR, FAMU, The Nature Conservancy, UWI, USDA/APHIS, and the Agricultural Ministries of the Greater Caribbean nations. The purpose of this presentation is to demonstrate the solid, long-term and on-going commitment of the Institute of Food and Agricultural Sciences at the University of Florida (UF/IFAS) to the invasive species efforts in the Greater Caribbean.

University of Florida and University of Puerto Rico faculty members have conducted research on pathogens and pests in the Caribbean for many years and some of these studies have been funded by the T-STAR Program since its inception. The invasion of Florida by alien invasive species was chronicled by Professor J. Howard Frank and he found that 270 species of exotic insects became established in Florida in the period of 1970 to 1989 for an average annual rate of 14.2 species (Frank, J. H. and E. D. McCoy. 1992, 1995). Since 1986 this task has fallen to Dr. Michael Thomas, Florida Department of Agriculture and Consumer Services, who found that from 1986 through 1999 the number of exotic insect species established each year varied

between 4 and 21 (Thomas 2000). Similar studies were conducted in Puerto Rico by Professor Rosa A. Franqui (1999), and in the Pacific Basin by Muniappan et al. (1991).

Alarmed by these findings, Mr. Dean F. Davis, the first T-STAR Director, urged that T-STAR conduct two workshops on invasive species, one with respect to the Caribbean Basin and the other with respect to the Pacific Basin. Mr. Davis asked Dr. Waldemar Klassen to take the lead in organizing and conducting the first of these international workshops, "Mitigating the effects of exotic pests on trade and agriculture, Part A, The Caribbean". This workshop was held at Homestead, Florida in June, 1999 (Klassen, 1999), and the second, Part B, The Pacific, was held at the University of Guam in 2001 (Klassen et al., 2002; Muniappan and Campbell, 2002). The proceedings of these two T-STAR workshops documented the vulnerability of the Caribbean and Pacific Basins to the influx of invasive species as a result of the globalization of trade, tourism and smuggling (Hara, 2002; Shannon, 1999). These findings were reinforced by a study of the National Plant Board (1999), "Safeguarding American plant resources. A stakeholder review of the APHIS-PPQ Safeguarding System" and by studies on the incursion of plant pathogenic viruses into the Western Hemisphere by Polston and Anderson (1997). Both the T-STAR workshops and the National Plant Board Study concluded that the century-old strategy of safeguarding against invasive alien species by inspecting cargo and travelers at ports of entry had become grossly inadequate, and that the focus of safeguarding mitigations have to be shifted to the sites of origin of imports and of baggage so that pest-free cargo and baggage would arrive at the ports of entry of importing countries (Zadig, 1999). Similar findings for animal invasive pests and diseases were dealt with in the Animal Health Safeguarding Review (2001) conducted by the USDA and the National Association of Departments of Agriculture (NASDA) Research Foundation; Roberts chaired the International Subcommittee for this review (NASDA, 2001).

Although the two T-STAR workshops resulted in an increased appropriation by the US Congress for research on invasive species, they had no discernible impact on safeguarding policies and aarrangements in the Greater Caribbean Region. Dr. William F. Brown, Assistant Dean for Research, University of Florida/IFAS and successor to Mr. Davis as T-STAR Director, was concerned that the myriad of research projects on invasive species conducted in the Greater Caribbean Region had not resulted in a slowing the rate of influx and spread of these harmful exotic creatures. Thus Dr. Brown perceived the need for a Caribbean invasive species strategy that would include international policy development and coordination among all countries and territories and include regulatory all relevant regulatory agencies. Moreover Dr. Brown felt that such international policy development should focus on enhancing detection, combating, forecasting and regulating invasive alien species.

In 2002 Dr. Brown was encouraged by the CFCS Board of Directors to hold a T-STAR Symposium on invasive species at the Society's 39th annual meeting in Grenada. Dr. Brown enlisted Drs. Klassen, Carlton Davis, Norm Leppla, J. Howard Frank, Gail C. Wisler, who were University of Florida faculty, as well as Connie Riherd of the Florida Department of Agriculture and Consumer Services, and Mr. Michael J. Shannon of USDA-APHIS to plan and organize the symposium: "Challenges and Opportunities in Protecting the Caribbean, Latin America, and the United States from Invasive Species" (Klassen et al., 2003). A most important outcome of this Symposium was the formation of the Caribbean Invasive Species Working Group, which immediately began to work on a strategy to slow the influx of invasive alien species into the

Region and to cope with those already present. Subsequent Symposia in this series have been held in Guadeloupe in 2005, in Puerto Rico in 2006 and now in Miami Beach (2008).

In 2004, Drs. Klassen and Davis and Mr. Bruce Luackner of CARDI took the lead in holding a followup workshop on "Facilitating Safer US-Caribbean Trade: Invasive Species Issues". To accomplish this expensive undertaking, the organizers used modest sums of funds from the University of Florida Center for Tropical Agriculture and the University of Florida International Agricultural Trade and Policy Center to leverage support from CAB International, CARDI, Caribbean Development Bank, FAO, IICA, Ministry of Agriculture, Lands and Marine Resources of Trinidad and Tobago, University of Florida T-STAR and the University of the West Indies. The Workshop was very well attended by representatives of Ministries of Agriculture, academic institutions, research and regulatory agencies, environmental groups, and private sector organizations. The Workshop reached consensus on the need to combat invasive alien species in coordinated Region-wide manner.

In order to support policy development and the development of institutional platforms for coordinated Regional safeguarding, T-STAR funded a grant: "Facilitation and Coordination of the Florida/Caribbean Basin Inter-Institutional Invasive Species Initiative" for the 3 years, October 2005 to September 2008, with Dr. Davis as Project Director and Dr. Klassen as co-director. Recently T-STAR funded a sequel titled: "Building Technical and Institutional Policy Support Platforms for An Effective US/Caribbean Basin Invasive Species Safeguarding System" for two years, October 2008 to September, 2010 with Dr. E. A. "Gilly" Evans as Project Director and Drs. Davis and Klassen as co-directors.

DESCRIPTION OF THE T-STAR PROGRAM

T-STAR leverages both state and federal funding for the advancement of agriculture, natural and human resources in tropical and subtropical regions. The T-STAR program was authorized by U.S. Congressional legislation and is an outgrowth of the World Food Conference in Rome in 1974. At that conference, representatives announced that the United States could not "feed the world" but would contribute to the assistance of developing countries in efforts to strengthen their own food production capabilities. The U.S. Congress has granted major funding through a T-STAR appropriation since the early 1990s with a funding level from $6 to 10 million per year usually provided.

T-STAR actually has two major components: 1) The Caribbean Basin Administration Group (CBAG) comprised of the University of Florida, the University of Puerto Rico and the University of the Virgin Islands, and 2) the Pacific Basic Administrative Group (PBAG) comprised of the University of Hawaii and the University of Guam.

Much of the research conducted in the temperate United States is not applicable to tropical areas. Florida is the only continental U.S. state that has tropical and sub-tropical agriculture. In tropical and sub-tropical climates there are large differences in climate, soils, crops, pests and diseases and in many developing nations there are socio-economic constraints. Plant pests and diseases have a year-round growing season in these climates and invasive species impact is severe with an escalating need for prevention and control. The challenges of tropical and subtropical agriculture

present significant requirement for additional efforts on post-harvest procedures, value-added processing and market development.

The overall T-STAR program goals are two-fold: to develop strategies and tactics to stem the influx of exotic diseases, insects and weeds and to control and/or eliminate existing non-indigenous species and diseases; and to provide research that maintains and enhances production of established tropical and subtropical agricultural products.

One of the main partnerships of the T-STAR program and the University of Florida has been the University's Caribbean Invasive Species Initiative. The spread of the invasive Tomato Yellow Leaf Curl Virus in the Caribbean Region is a dramatic example of the need for such partnerships on invasives. This devastating invasive was discovered on the southern tip of Cuba in 1987, next detected in Dominican Republic and Haiti in 1990, then in the Bahamas in 1996, in south Florida in 1997 (where it has rapidly spread throughout the entire state), in 2001 it was discovered in Puerto Rico and Guadeloupe, and in 2002 in Dominica. It is safe to say that this pest is prevalent throughout the Greater Caribbean today wreaking havoc on the food production and native species. Florida growers spend at least $800 per acre each year in attempts to control the disease.

The successful history of this tropical and subtropical research program may be found on the University of Florida website at http://research.ifas.ufl.edu/T-STAR.asp. This includes the T-STAR program description, the program's history, strategic plan, operational policies, as well as other program summaries. Of most interest to the Greater Caribbean Region are the research highlights and the new current projects sections where all the T-STAR projects are listed for each year beginning in 1996. For instance, the current projects in progress for 2008 are shown in A. Research highlights of each project affecting tropical and subtropical agriculture can be accessed.

The mission of T-STAR is to conduct high quality and useful agricultural research which is provides information and technologies relevant to industry needs, has demonstrated impact, protects the environment, enhances economic opportunities, and provides for the social well-being of the people in the tropical and subtropical regions of the United States of America through collaborative efforts.

Florida's agriculture as part of the Greater Caribbean Region is a very fragile ecosystem not only providing for food production but also for tourism, recreation and ecological diversity. This mission and this statement explain clearly why the cooperation and collaboration of the T-STAR program and the Caribbean Invasive Species Working Group is so important.

To expand further, the T-STAR program has multiple goals involving; current agricultural products, environment, value-added agriculture, new food and fiber products, expanding agricultural linkages, decision support systems, non-indigenous pests and diseases, and nutrition and health. Some examples of the T-STAR goals clearly show how the objectives of these goals mesh with the Caribbean invasive species effort. On the environment, T-STAR seeks to develop agricultural practices that are environmentally acceptable through an agro ecosystem's approach in fragile systems susceptible to invasive species degradation. On value-

added agriculture, this goal seeks to enhance the role of value-added agriculture in tropical island ecosystems. For new foods and fibers goal, T-STAR seeks to expand and diversify presently unexploited food and fiber products which have potential for commercial production in the U.S. tropical and subtropical regions all the while realizing this cannot be achieved without invasive species control. In the area of expanding agricultural linkages, T-STAR has a goal to expand tropical and subtropical agriculture's linkages to related industries and economic sectors. The decision support systems goal seeks to develop and deliver user friendly decision support packages to help client needs.

For this program, T-STAR's goal on non-indigenous pests and diseases (CORE) is most appropriately known by this acronym for it is at the core or heart of T-STAR to develop strategies to stem the influx of invasive pests and diseases and work to control or eliminate such species. And last, but not least, in nutrition and health, T-STAR seeks to enhance linkages of the agriculture and food system with nutrition, health, and socio-economic status of the people in the tropical and sub-tropical regions.

In the past, the UF/IFAS T-STAR has made diligent efforts to support

- Development of Regional Strategy to cope with invasive species (CRISIS)
- Development of Regional Network – Caribbean Invasive Species Working Group (CISWG)
- Development of an Implementation Plan - Caribbean Invasive Species Surveillance and Information Program (CISSIP)
- Efforts to move forward in partnership throughout the Caribbean

The state of Florida has experienced frequent and devastating losses from invasive species due to the costs of interdiction, control, eradication and loss of markets and trade. The eradication effort for citrus canker, most recently detected in Miami in 1995, cost over $2 billion in state and federal funds before defeat was declared due to widespread dissemination of the disease from hurricanes and tropical storms. Florida regrettably has the record of detecting one new arthropod per month entering the U.S. through Florida ports and airports. In addition, at least four new animal diseases, never before detected in the U.S., are identified in Florida each year coming through our ports and airports.

CARIBBEAN INVASIVE SPECIES WORKING GROUP (CISWG)

The record of losses from invasive species makes our regional collaborations and partnerships on invasive species a critical effort to the Greater Caribbean of which Florida is a part. UF/IFAS has been a long term partner with CABI, the Caribbean Research and Development Institute (CARDI), the CARICOM Secretariat, CIRAD, Service de la Protection des Végétaux, Direction de l'Agriculture et de la Forêt, France, Costa Rica Ministry of Agriculture FAO, PAHO, IDIAF, IICA, Ministries of Agriculture, The Nature Conservancy, University of West Indies, University of Puerto Rico, Florida Agricultural & Mechanical University (FAMU) and USDA-APHIS.

The partnership proposed a Region-wide strategy to strengthen national safeguarding capabilities and to develop a coordinated Regional safeguarding network. The Caribbean Regional Invasive Species Intervention Strategy, with the appropriate acronym of "CRISIS", was recognized as a

valuable strategic framework for the Region and was accepted by the Council on Trade and Economic Development (COTED) of CARICOM in May 2008, as well as by the French Government, Dominican Republic, Costa Rica, and USDA/APHIS.

As soon as this overall strategy was in place, we began to work diligently to prepare an implementation program to put the strategy into effect. This implementation plan, known as the Caribbean Invasive Species Surveillance and Information Program (CISSIP) has not yet taken effect comprehensively; however, parties are seeking full funding and various components have been put in place with resources currently available with various partners. CISSIP components include the Caribbean Regional Diagnostic Network (CRDN), developing and enhancing laboratory diagnostic capacities, Pest Survey and Inspection Program (PSIP), Invasive Species Information System (ISIS), training programs for field and laboratory identification and diagnosis, a Public Education Program (PEP), and capacity building programs for plant and animal protection personnel in Caribbean Ministries of government. It is envisioned that CISSIP will have close links with CaribVET, which treats animal and zoonotic pathogens.

This CISSIP implementation program does indeed provide an umbrella of efforts on invasive species, agricultural, animal and plant health threats, agricultural bioterrorism, sanitary and phytosanitary trade barrier issues, and zoonotic diseases. The program combines not only agricultural interests but also non-agricultural public issues such as natural resource protection, ecosystem diversity, human health and safety and food security and availability.

KEY INVASIVE SPECIES SUPPORTERS AT UF/IFAS

The key supporters and partners associated with the T-STAR program at the University of Florida are at the highest level. Dr. Jimmy Cheek, Senior Vice President for Agriculture and Natural Resources and head of the Institute of Food and Agricultural Sciences has been a long time supporter of T-STAR and invasive issues. (Editorial note: In February, 2009 Dr. Cheek left UF/IFAS to become Chancellor at the University of Tennessee. Dr. Larry Arrington, UF/IFAS Dean for Extension, is now the Interim Senior Vice President.) Dr. Mark McLellan is Dean for Research, IFAS, and Director of the Florida Experiment Station. The invasive species thrust in the Greater Caribbean has been strongly championed by three individuals: Drs. Bill Brown, Waldemar Klassen and Carlton Davis. Dr. Bill Brown, former Assistant Dean for Research and a CISWG leader was former head of T-STAR at UF/IFAS and is now Dean for Research at the University of Tennessee. Dr. Waldemar Klassen, Professor Emeritus and long term invasive species researcher, has been a leader on the CISWG since its inception. He retired in January, 2009, but continues to actively assist Dr. E. A. "Gilly" Evans with the T-STAR Project: "Building Technical and Institutional Policy Support Platforms for an Effective US/Caribbean Basin Invasive Species Safeguarding System". Dr. Carlton Davis, Distinguished Service Professor, Food and Resource Economics Department, retired in December, 2008, but he, too, continues to assist Dr. Evans with the above Project. Dr. Martha Roberts has served in a supportive role as Ex Officio Secretary for CISWG to which she brought experiences of long term state government service. Her service has been greatly reduced because of the current budget crisis in Florida's government.

The new T-STAR and invasive species team at UF/IFAS includes Dr. Doug Archer, Professor and Associate Dean for Research, IFAS, former Assistant U.S. Surgeon General and former head of the Department of Food Science and Human Nutrition who now heads the T-STAR program. Dr. David Sammons, Director of International Programs, UF/IFAS, will be the new face of IFAS for CISWG and is the former Special Advisor with US AID and Associate Dean of the College of Agriculture and Head of International Programs at Purdue University. Responsibility for the University of Florida role in developing and operation the Caribbean Regional Diagnostic Network has been vested in Dr. Tim Momol, District Extension Director and Professor of Plant Pathology.

Many faculty, in addition to those named above, have been long time supports of invasive species efforts in the Caribbean, including but not limited to: Stephen Brown, Harold Browning, James Cuda, Edward "Gilly" Evans, Joseph E. Funderburk, Robin Giblin-Davis, Michael J. Davis, J. Howard Frank, Amanda Hodges, Forrest "Bill" Howard, John VanSickle, Marjorie A. Hoy, Carrie Harmon, Lance Osborne, Aaron Palmateer, Randy Ploetz, Jane Polston, Robert J. McGovern, Tim Momol, Jiannong Xin, Kenneth A. Langeland, Norm Leppla, Yuncong Li, Jorge Pena, Pamela Roberts, Bielinski M. Santos, Dakshina Seal, Rudolf Schreffran, Tom Spreen, Philip Stansly, Chris Waddill, Van Waddill, Susan Webb, Sara Workman, etc.

UF/IFAS EFFORTS ON INVASIVES

The UF/IFAS T-STAR program helped organize and supported invasive species symposia and training efforts across the region beginning in 2003 in Grenada, followed by the next symposium in Trinidad in 2004, Guadeloupe in 2005, Puerto Rico in 2006 and Miami in 2007. This UF/IFAS program has been an active participant in CISWG, has worked with partners in CRISIS and CISSIP, and worked to establish Digital Diagnostic Centers in the Dominican Republic and Haiti and provided DDIS training efforts.

Internal Florida efforts on invasive species have included:
1. T-STAR Workshop: Winning the War on Invasive Species - Miami 2007
2. Showcased and discussed the application of software developed to assist in evaluating the economics of managing invasive species in agriculture and the environment
3, Formation of UF/IFAS Invasive Species Coordinating Council in 2007 to create university coordination with wide-spread faculty involved in invasive species efforts
4. Operation of the Center for Aquatic and Invasive Plants and participation in the Florida Exotic Pest Plant Council

UF/IFAS has many statewide research and education facilities and has extension offices in all 67 counties providing needed knowledge in agriculture, human and natural resources and the life sciences.

SUMMARY

The T-STAR program at UF/IFAS continues to strongly support the Caribbean Invasive Species issues with close partnerships throughout the region. The Program strongly supports the Caribbean Invasive Species Working Group (CISWG), the regional strategy, CRISIS, and efforts

to implement the components of CISSIP by means of available resources and by seeking grant support. We are honored to host this invasive species symposium in Florida and to continue our regional partnerships through active strong support and leadership.

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Table 1. Research Projects funded in Florida by the USDA-CSREES T-STAR Program in 2008

Title of Project	**Project Director**	**Period of Project**
Control of the Citrus Root Weevil with Trypsin Modulating Oostatic Factor and Cathepsin L specific inhibitor.	Borovsky, Dov (FL)	2 Years - Start: 10/08
An integrated approach for sustainable control of chilli thrips, Scirtothrips dorsalis Hood	Chen, Jianjun (FL)	2 Years - Start: 10/08
Building Technical and Institutional Policy Support Platforms for an Effective US/Caribbean Basin Invasive Species Safeguarding System	Evans, Edward (FL)	2 Years - Start: 10/08
Control of Mexican Bromeliad Weevil-An Invasive Species	Frank, J. Howard (FL)	2 Years - Start: 10/08
Resistance in the southern cattle tick, Boophilus microplus, to acaricides used on St. Croix and Puerto Rico	Kaufman, Phillip (FL)	2 Years - Start: 10/08
Investigating bio-ecological factors influencing infestation of the invasive passionvine mealybug, Planococcus minor (Maskell) (Hemiptera: Pseudococcidae). A potential threat to the US	Liburd, Oscar (FL)	2 Years - Start: 10/08
"Potential of indigenous and commercially produced predators for biological control of the newly introduced red palm mite, Raoiella indica "	Pena, Jorge (FL)	2 Years - Start: 10/08
GIS-Based Spatial Analysis of Movement of Silverleaf Whitefly and Begomovirus	Schuster, David (FL)	2 Years - Start: 10/08
Development of knowledge and technologies to manage chilli thrips, Scirtothrips dorsalis Hood (Thysanoptera: Thripidae)	Seal, Dakshina (FL)	2 Years - Start: 10/08

Title of Project	Project Director	Period of Project
Analysis of recessive resistance in pepper to the bacterial spot pathogen: durability and interaction with a worldwide collection of strains of Xanthomonas species.	Jones, Jeffrey (FL)	2 Years - Start: 10/08
Management, epidemiology and detection of laurel wilt on avocado and avocado relatives in Florida	Ploetz, Randy (FL)	2 Years - Start: 10/08
"Molecular Surveillance for Emerging Pathogenic Plant Viruses: A Proactive Approach to Protecting Agriculture"	Polston, Jane (FL)	2 Years - Start: 10/08
Orange Rust of Sugarcane: Assessing Its Impact in the U.S. and Caribbean and Development of Management Strategies for Its Economic Control	Raid, Richard (FL)	2 Years - Start: 10/08
Assessment of the threat represented by the new genotypes of Phytophthora infestans causing late blight on tomato in Florida for improved integrated management strategies	Roberts, Pamela (FL)	2 Years - Start: 10/08
Developing Non-invasive Genotypes of the Biofuel and Forage Crop Napiergrass	Altpeter, Fredy (FL)	2 Years - Start: 10/08
Genetic Sterilization for Preventive Control of Invasiveness in Lantana camara	Deng, Zhanao (FL)	2 Years - Start: 10/08
Implementation of the IFAS Assessment of Non-Native Plants in Florida's Natural Areas	Ferrell, Jason (FL)	2 Years - Start: 10/08
Melaleuca quinquenervia - a model system for elucidating belowground mechanisms of plant invasions.	Giblin-Davis, Robin (FL)	2 Years - Start: 10/08
Removal of Para Grass (Urochloa mutica) in Wetlands to Restore Wildlife Habitat	Mac Donald, Greg (FL)	2 Years - Start: 10/08
Smutgrass biology and management in tropical grazing systems	Sellers, Brent (FL)	2 Years - Start: 10/08

Title of Project	Project Director	Period of Project
Genetic, Morphological, and Reproductive Characterization of Invasive Elephantgrasses and Genotypes Selected as Bioenergy Crops	Sollenberger, Lynn (FL)	2 Years - Start: 10/08
Effects on Morbidity and Mortality in *Perkinsus marinus*-infected *Crassostrea virginica* exposed to Exotic Perkinsus from Imported Ornamental Clams, *Tridacna crocea*	Sheppard, Barbara (FL)	2 Years - Start: 10/08
Black Sigatoka Resistant Banana and Plantain Hybrids: Introduction, Value Adding, and Marketing Perspectives	Perez, Fernando (FL)	2 Years - Start: 10/08
Suppression of the coffee berry borer, *Hypothenemus hampei* (Ferrari), populations by means of biological control for a sustainable coffee production in Puerto Rico.	Gallardo, Fernando (FL)	2 Years - Start: 10/08
Characterization and control of new and emerging viruses affecting cucurbits in Puerto Rico	Rodrigues, Jose (FL)	2 Years - Start: 10/08
Integrated Management of Black Sigatoka of *Musa* sp.	Chavarria-Carvajal Jose (FL)	2 Years - Start: 10/08
Polymorphic Genes Evaluation in Senepol Cattle Germplasm	Pagan, Melvin (FL)	2 Years - Start: 10/08
The Effect of Hair Color and Type on Heat Tolerance, Tick Resistance and Growth Rate of Cattle Under Grazing Conditions	Godfrey, Robert (FL)	2 Years - Start: 10/08