FLORIDA ENTOMOLOGICAL SOCIETY
2007 ANNUAL MEETING ABSTRACTS

PIONEER LECTURE

The Florida Entomological Society will honor William and Nadine McGuire with the Pioneer Lecturer Award at the Annual Meeting held on July 15-18, Ritz Carlton Resort in Sarasota, Florida. Their accomplishments and contributions to science, culture, and the world at large are incalculable. It is indeed fitting that we honor them for their remarkably philanthropy in founding the McGuire Center for Lepidoptera and Biodiversity at our state's Florida Museum of Natural History at the University of Florida and for their research contributions on the life histories and taxonomic studies on the skipper butterflies (Hesperioidea), an exceedingly difficult group. In addition, they have provided leadership with their interest in endangered species, biodiversity, conservation and the environment, and the major role that entomological collections can play in the documentation of species diversity.

Bill's talent in cardiopulmonary and trauma care medicine were honed at the University of Texas, Scripps Institute in California, and the Penrose/Broadmoor Hospital complex in Colorado Springs, Colorado. By 1984 his extraordinary medical and management skills attracted the attention of the President of a tiny, nascent HMO in Colorado Springs, Peak Healthcare Systems. Starting as Vice President, he soon became President and CEO. In 1988 he became Executive Vice President of United Healthcare and President in 1989, and the rest is history. His talents, insights, and vision built United Health into a $30-billion corporation and the leading health maintenance organization in the world.

During this meteoric rise in the medical business world, Bill did not forget his roots in the natural sciences. He built the world's finest collection of the Giant Skipper butterfly family, Megathymidae, as well as the Hesperia skippers, in which he became a self-taught expert taxonomist. With Nadine's help in the field and assistance on the life history studies, he described a number of new taxa from California, Texas, and elsewhere in the western United States. This work continued, and with formal scientific papers published as recently as 1998, these are still widely acclaimed for their accuracy and detail. He has donated these and other exceptional scientific collections worth millions of dollars to the University of Florida for study here by students and staff in perpetuity. Additionally, during the past 20 years, Bill and Nadine McGuire have quietly made numerous personal financial gifts to support graduate student fellowships and endangered species research with Lepidoptera.

When their oldest daughter expressed an interest in completing a summer environmental internship working at the Endangered Species Laboratory at the University of Florida, the McGuires visited the University of Florida campus for the first time. They were astounded at the productivity of the staff and students working on numerous endangered species and the research completed in the very limited facilities. Noting this along with the promise of many talented faculty, curators, and students working with the

University's research collections of Lepidoptera scattered in seven different buildings across the home campus, and south to Sarasota, Bill and Nadine McGuire took the initiative in June 2000 to request a proposal that might unite all these academic units and activities in one great world-class Center that would address biodiversity and environmental problems, focusing on Lepidoptera as a flagship group, but other organisms as well. Upon review of this proposal and through a subsequent series of extraordinary gifts of over $7 million from the McGuire Family Foundation to UF along with state matches, the McGuire Center for Lepidoptera and Biodiversity was brought to reality by mid 2004 in a new 49,000 square foot building complex, representing a $12 million private and matching public investment. Here visitors can watch scientists at work inside glass-walled laboratories, see and experience living tropical insects behaving under natural conditions (and even landing on them), and learn much factual information about scientific fields such as evolution, ecology, genetics, behavior, physiology, and development from the many displays and interpretive exhibits which use the familiar, innocuous "butterfly" as a pedagogical hook to draw their interest. This complex also contains extensive new public exhibits and educational space, research and extensive major research collections and facilities, endangered species research laboratories, and is one of the major world research centers on the Lepidoptera.

The McGuires have an equally strong interest in culture and the arts. This is an especially passionate pursuit for Nadine McGuire, who has served on many national and regional museum and theatrical boards, including the Kennedy Center in Washington, D.C. Their joint interest in the promise of UF's Theatre and Dance program in the College of Fine Arts resulted in a $2.5 million gift to that college to establish the new Nadine M. McGuire Pavilion of Theatre and Dance, and to also completely renovate the Constans Theater facility as part of that $10 million project in 2004. In her capacity as President of the McGuire Family Foundation and as Bill's close partner, she has had equal responsibility and for the major influence that their Foundation has already generated, dispersing over $50 million in the past year alone to carefully selected philanthropic causes across the U.S.

William and Nadine McGuire have had a major impact on science, culture, and educational opportunities at the University of Florida and at a number of educational institutions throughout the U. S. as well as internationally. Their vision on the environment and conservation and the use of entomological collections, especially those with Lepidoptera, to document biodiversity and to research the potential negative or positive changes over time, has and will continue to have exceptional ramifications throughout the scientific and the world community at large. Their extraordinary accomplishments over their lifetimes, and by providing opportunities for scientific and cultural studies through their philanthropy at a number of academic institutions throughout the U. S., especially at the University of Florida, make this couple eminently deserving of the Pioneer Lecturer Award.

Pioneer Lecturer Biographical Sketch:

Thomas C. Emmel

Thomas C. Emmel is Director of the new McGuire Center for Lepidoptera and Biodiversity, as well as Professor of Zoology and Entomology, and Curator of Natural Sciences with the Florida Museum of Natural History, at the University of Florida in Gainesville. He has served as Director of the Boender Endangered Species Laboratory at U.F. since its inception in 1995.

His Ph.D. in Population Biology was obtained under Paul R. Ehrlich at Stanford University, from whence came his intense life-long research interest in ecological and conservation issues. He has also written extensively about the biology, taxonomy, genetics, behavior, and ecology of butterflies, tree snails, and general biology topics. Author of more than 400 publications, including 35 books, he has worked intensively since 1984 on the endangered Schaus Swallowtail butterfly in the Florida Keys and is currently directing an extensive captive propagation and reintroduction effort to help this endangered species recover to the point where it can be taken off the federal endangered species list. His research on the effects of mosquito control pesticides on nontarget wildlife and humans living in south Florida have led to better control measures for the use of pesticides and enhanced survival of wildlife as well as improved human health conditions in the Keys. Outside the U.S., he has worked extensively on biodiversity patterns and adaptive ecology of species in Brazil, Costa Rica, Ecuador, Dominican Republic, Kenya, Tanzania, Mexico, Madagascar, Ghana, Malaysia, Papua New Guinea, Irian Jaya, Solomon Islands, Society Islands, and Taiwan. He has a major project in Jamaica on endangered species conservation planning for the Homerus Swallowtail butterfly. Since April 2002, he has also helped to direct an extensive ecological study and restoration effort for the endangered Miami Blue butterfly in the Florida Keys.

In the classroom, Dr. Emmel has annually taught the largest nonmajor biology courses in U.F.'s Carleton Auditorium, including tens of thousands of undergraduate students since 1968, and has employed many of the best of these students in his research programs on chromosome structure, insect conservation and ecology, including summer expeditions to the far corners of the globe. He also directs as many as 20 master's and doctoral graduate students each year in the Departments of Entomology and Zoology.

Some of the more recent books authored or edited by Thomas C. Emmel include *Systematics of Western North American Butterflies* (1998); *Butterfly Gardening* (1997); *Florida's Fabulous Butterflies* (1997); chapters in *Swallowtail Butterflies: Their Ecology and Evolutionary Biology* (1995); *Rare and Endangered Biota of Florida*. *Vol. 4. Invertebrates* (1995), and *Conservation Biology of Lycaenidae (Butterflies)* (1993); *Butterflies of the Florida Keys* (1993); *Florissant Butterflies: A Guide to Fossil and Present-day Species of Central Colorado* (1992); *Mosquito Control Pesticides: Ecological Impacts and Management Alternatives* (1991); *Butterflies* (1991); *Biology* (1989); *Butterflies of California* (1989); *Florida Environmental Guide* (1986); *Biology* (1986); *World Within Worlds: An Introduction to Biology* (1977); *Global Perspectives on Ecology* (1977); *Butterflies: Their World, Their Life Cycles, Their Behavior* (1975, various foreign editions 1976); *The Butterflies of North America* (1975); *Population Biology* (1976); *The Butterflies of Southern California* (1973); *An Introduction to Ecology and Population Biology* (1973); and other works.

Pioneer Lecturer Biographical Sketch:

Jacqueline Y. Miller

Jacqueline Y. Miller currently serves as the Allyn Curator of Lepidoptera, Florida Museum of Natural History and the Associate Director of the McGuire Center for Lepidoptera and Biodiversity. As an Adjunct Professor in the Departments of Entomology and Nematology and Zoology, she also serves a number of graduate student committees at the University of Florida and at other institutions. Dr. Miller received her B. S. in Biology from the University of Pittsburgh, a M. S. in Entomology, Catholic University of America (Washington, D. C.), and a Ph. D. in Zoology from the University of Florida.

She is active in a number of scientific organizations, especially the Lepidopterists' Society (Chairman and Editor, Consensus of Common Names Committee, 1984-1992; Chairman, Committee future meeting sites, 1986-94; Vice-President, 1987-88; President, 1989-90; Past-President, 1990-91; Co-Chairman, Education Committee, 1990-2001), Entomological Society of America (Section A, Systematics: Secretary 1997-98; Vice-Chairman, 1998-99; Chair, 1999-2000); Section A (Systematics) Representative to the Governing Board, 2002-2005; Systematics Resources Committee, 1994-1997; 2000-2004) and the Entomological Collections Network (Steering Committee 1995-1997; Co-chaired meetings 1997, 2005; member, Collections Standards Committee, 2001-2003.)

Dr. Miller was associated with the Allyn Museum of Entomology, which became affiliated with the Florida Museum of Natural History, University of Florida, in 1981. For many years, this was an off campus unit of the Florida Museum and based in Sarasota, Florida, where she and her husband and fellow Allyn Curator, Dr. Lee D. Miller, developed one of the finest curated and well documented Lepidoptera collections that is international in taxonomic scope and geographic distribution. With the development of the McGuire Center on the main campus, this collection of more than 1.2 million specimens, library, equipment, and other associated materials were moved to the University of Florida in late June, 2004. The original scientific collection has become the basis of phylogenetic arrangement for the McGuire collections that now total more than 6.9 million specimens with another major collection of 2 million currently under inventory.

Author of more than 148 scientific publications, including seven books, her research interests focus on the systematics, taxonomy, biogeography, and life history studies of Lepidoptera, especially in the Hesperioidea, Nymphalidae, and Castniidae. Past and current research efforts have focused primarily on revisionary and biodiversity studies of neotropical taxa, emphasizing unique diagnostic morphological features and integrating ecological and behavioral observations when applicable. Her current research studies are concentrating on phylogenetic analysis and vicariance biogeography of Lepidoptera, especially the endemic genera in the West Indies, Caribbean basin, and Mexico. These investigations provide clues and/or supportive data to our understanding of the higher

taxonomic categories and the evolutionary history of the Lepidoptera. The Millers have devoted more than 35 years completing biodiversity surveys in neotropics, especially in the Caribbean basin, but their research studies have also taken them to Africa.

Pioneer Lecturer Biographical Sketch:

Jaret C. Daniels

Dr. Jaret C. Daniels is IFAS Assistant Professor of Entomology and Assistant Curator for the Florida Museum of Natural History's McGuire Center for Lepidoptera and Biodiversity. He holds an affiliate position with UF's School of Natural Resources and Environment. Jaret received his B.S. in Biology from Saint John's University in Minnesota and Ph.D. from the Department of Entomology and Nematology at the University of Florida. He completed his Postdoctoral training in insect conservation at the Florida Museum of Natural History in Gainesville. His research focuses on insect ecology and conservation, with particular emphasis on Lepidoptera, seasonal ecology, population biology, and behavior. He has over 16 years of experience working with imperiled Lepidoptera in the U.S. and Caribbean, including Schaus' swallowtail (*Papilio aristodemus ponceanus*), Sweadner's haistreak (*Callophrys gryneus sweadneri*), Bartram's hairstreak (*Strymon acis bartrami*), Florida leafwing (*Anaea floridalis*), Jamaican giant swallowtail (*Papilio homerus*), frosted elfin (*Callphrys irus*), and the Miami blue (*Cyclargus thomasi bethunebakeri*). These projects have involved various aspects of research, recovery and public education. He is the founder and director of the Florida Butterfly Monitoring Network (www.flbutterflies.net), a multi-agency program that brings together volunteers and scientists to promote and survey the health of butterfly populations throughout Florida. He currently serves as Co-Chair of the steering committee for the Butterfly Conservation Initiative (www.butterflyrecovery.org), a national consortium of conservation organizations across North America dedicated to the conservation of threatened, endangered, and vulnerable North American butterflies and the habitats that sustain them, with a focus on recovery, research, and education. He has authored more than 50 scientific papers, popular articles, and books dealing with butterflies, conservation, integrated pest management, and wildlife landscaping.

M. S. STUDENTS

Alexandra, C. & P. Koehler. **Testing vapor toxicity of novel, volatile, low molecular weight esters on *Aedes aegypti* and *Musca domestica*.**

Volatile insecticides have been widely used for the protection of stored agricultural products and for the management of structural pests. However, they have been neglected for the control of pests of medical importance. This study examined vapor toxicity of novel, volatile, low molecular weight esters on mosquitoes of the species *Aedes aegytpi* and flies of the species *Musca domestica.*

Bayer, B. & P. Koehler. **Efficacy of gel baits formulated with emamectin benzoate on pest cockroaches.**

Cockroach bait aversion by German cockroach is an emergent problem. In this study, the efficacy of gel baits formulated with technical emamectin benzoate at 500, 1000, and 2000 ppm and Proclaim® 5SG at 1000 ppm were tested on four species of pest cockroaches: German (bait averse strain), Brownbanded, American, and Oriental.

Carrillo, D., R. E. Duncan & J. E. Peña. **Effect of host plants on successful parasitism of *Haeckeliania sperata* (Hymenoptera: Trichogrammatidae) on *Diaprepes abbreviatus* (Coleoptera: Curculionidae) eggs.**

Haeckeliania sperata is a gregarious endoparasitoid that attacks *Diaprepes abbreviatus* eggs. Differences in leaf thickness and trichome density on the successful oviposition of *H. sperata* were investigated. Six host plants with varying degrees of pubescence were used. Searching speed on the leaf surfaces had a significant effect on percent of parasitism. Removing trichomes from a host plant increased the searching speed of the parasitoid, showing that leaf pubescence affects the reproductive success of this parasitoid.

Ferreira, M. T. & R. H. Scheffrahn. **Efficacy of chlorpenapyr-treated wood to prevent colonization by dealates of the West Indian drywood termite, *Cryptotermes brevis*.**

Cryptotermes brevis is an important pest of structural lumber. Observation confirmed that dealate pairs of *C. brevis* crawl over wood substrata before selecting a nuptial chamber. It is hypothesized here that this searching behavior would increase the likelihood of contact with a non-repellent insecticide when applied to only a portion of the wood surface. Six-hundred ppm of chlorfenapyr was applied to wood squares with drilled holes that served as colonization points and mortality was assessed.

Pfiester, M. **The effect of sex-ratio on bed bug aggregation behavior.**

The common bed bug *Cimex lectularius* L. usually occurs in aggregations, but lone bed bugs, separate from the aggregations, are also a common observation. We hypothesize that females may leave an aggregation in order to avoid multiple traumatic inseminations. The effects of sex-ratio on the movement and aggregation behavior of bed bug populations was studied. Small populations were placed in arenas, and the number of aggregations and lone bugs was measured over time.

Scott, C. A. & O. E. Liburd. **Tracking insect populations within organic vegetable systems to determine how residual populations from cover crops affect vegetable production.**

In organic systems, cover crops have been shown to reduce insect pest populations in subsequent cash crops. Experiments were conducted to track insect pests and natural enemies from cover crops to broccoli and squash. Plots treated with graminaceous cover crops had significantly fewer aphids and whiteflies compared with leguminous cover crops. Cover crop mixtures also had significantly fewer pests compared with single cover crops. Potential benefits for this sustainable approach towards pest management are discussed.

Ph. D. STUDENTS

Amarasekare, K. G., J.-H. Chong, C. M. Mannion & N. D. Epsky. **Effect of temperature on the biology of *Paracoccus marginatus* Williams and Granara de Willink (Homoptera: Pseudococcidae).**

Effect of temperature on the biology of *Paracoccus marginatus* was investigated. *P. marginatus* was able to develop and complete its life cycle at 18°, 20°, 25° and 30°C. At 15°, 34° and 35°C eggs hatched, but further development was arrested. Approximately 80 -90% of the eggs survived between 20° - 30°C. Highest fecundity was at 25°C. Thermal constants and minimum and maximum temperature thresholds were estimated for egg, male and female nymphal stages and adults.

Diaz, R., W. A. Overholt, J. P. Cuda & P. Pratt. **Temperature-dependent development, survival and potential distribution of *Ischnodemus variegatus* (Hemiptera: Blissidae), an herbivore of West Indian marsh grass (*Hymenachne amplexicaulis*).**

Ischnodemus variegatus (Signoret) (Hemiptera: Blissidae) is an exotic herbivore, native to South America, that feeds on the invasive grass *Hymenachne amplexicaulis*. The influence of temperature on the developmental time and survival of *I. variegatus* was studied under laboratory conditions. Complete egg and nymphal mortality occurred at temperatures $\leq 20.5^0$C and at 38^0C. Developmental time was fastest between 28 and 30^0C. Results will be used to predict the spatial distribution and population growth of *I. variegatus* in *H. amplexicaulis* infested regions.

Goyal, G., G. J. Steck, G. S. Nuessly & J. L. Capinera. **Establishing identity of corn silk flies, *Euxesta* spp.**

Euxesta eluta Loew and *E. stigmatias* L., commonly known as corn silk fly (Ulidiidae: *Euxesta* spp.) are considered serious pests of sweet corn (*Zea mays* L.). Due to the overlapping distributions of these species, it is important to be able to distinguish their immature stages to help determine their biological differences and feeding behavior. Using light scanning electron microscopy, larvae and pupae were found to be significantly different with respect to certain morphological characters.

Herbert, J. & R. F. Mizell. E**ffect of crape myrtle (*Lagerstroemia* spp.) parentage on crapemyrtle aphid (*Sarucallis kahawaluokalani*) and tritrophic interactions with the lacewing *Chrysoperla rufilabris*.**

Seven cultivars of crape myrtle (*Lagerstroemia* spp.) were tested for their host suitability by rearing crapemyrtle aphids on excised leaf disks. Daily fecundity was measured for the lifespan of each individual aphid. Larvae of *Chrysoperla rufilabris* were fed crapemyrtle aphids from the same seven cultivars, and each group of *C. rufilabris* larvae was fed aphids that came exclusively from one cultivar. Survivorship and adult dry weight were measured and used to construct hypotheses about tritrophic interactions.

Manrique, V., J. P. Cuda, W. A. Overholt & D. Williams. **Evaluating the survival of two candidate biological control agents (*Episimus utilis* and *Pseudophilothrips ichini*) on Brazilian peppertree genotypes.**

Brazilian peppertree, an introduced plant from South America, has invaded most habitats in south-central Florida. Survival of two candidate biocontrol agents (*Episimus utilis* and *Pseudophilothrips ichini*) was tested on the different Brazilian peppertree genotypes found in Florida and Brazil (native range). Survival to adult of *E. utilis* was similar among Florida genotypes, while survival of *P. ichini* was greater on Brazilian genotypes. The ecological significance of the results is discussed in the context of plant genotypes and host specificity.

Martin, C. G., C. M. Mannion & B. Schaffer. **The effects of larval herbivory by *Diaprepes* root weevil, *Diaprepes abbreviatus* (L.) (Coleoptera: Curculionidae) on four woody ornamental plant species.**

We tested the hypothesis that larval herbivory by *Diaprepes* root weevil (DRW) reduces biomass and leaf gas exchange of the following landscape plant species: buttonwood (*Conocarpus erectus* L.), Surinam cherry (*Eugenia uniflora* L.), mahogany (*Swietenia mahogani* Jacq.), and pond apple (*Annona glabra* L). Data collected included leaf gas exchange [CO_2 assimilation (A), transpiration (E), stomatal conductance (g_s), and internal CO_2 concentration (C_i)], fresh and dry weights of roots, stems and leaves, plant height and stem diameter, the number of larvae, pupae and adults recovered per plant and larval head capsule widths. Mean leaf gas exchange values were significantly higher for non-infested than infested buttonwood and Surinam cherry. For mahogany and pond apple, there were few or no significant differences in leaf gas exchange between the treatments. Fresh and dry weights were also higher for non-infested than infested plants with the differences for buttonwood the most often significant, followed by Surinam cherry, mahogany, and pond apple which showed insignificant differences. There were no significant effects of larval herbivory on plant height and stem diameter or the total number of larvae, pupae and adults recovered per plant. There was a significant difference among plant species in the mean head capsule width (thus larval instars) recovered from the soil, with Surinam cherry having the largest, followed in size by buttonwood, pond apple, and mahogany. Although plant growth and biomass of pond apple were not affected by larval feeding, it exhibited root-feeding damage as did the other three plant species. All four plant species are thus hosts of DRW. In addition to adding pond apple to the list of DRW host plants, the present study supports previous work showing that buttonwood, Surinam cherry and mahogany are susceptible to damage from DRW larvae. Our findings also suggest the following order of vulnerability of these host plants to larval feeding damage: buttonwood and Surinam cherry are the most vulnerable plants species followed by mahogany and then pond apple.

Rangasamy, M., B. Rathinasabapathi, H. J. McAuslane, R. H. Cherry & R.T. Nagata. **Role of leaf sheath anatomy, toughness and lignification in resistance against southern chinch bug, *Blissus insualris* Barber (Hemiptera: Blissidae) in St. Augustinegrass lines.**

Southern chinch bug (SCB), *Blissus insularis*, is a serious insect pest of St. Augustinegrass. 'FX-10' and NUF –76 show high level of resistance to SCB. Differences in plant anatomy, lignification, and stylet penetration of SCB in leaf sheath as mechanisms of resistance are being studied and results will be presented.

Rhodes, E. M. & O. E. Liburd. **The effect of variety, treatment threshold, and insecticides on flower thrips management in Florida's southern highbush blueberries.**

Flower thrips are key pests of Florida blueberries. Two field experiments were conducted: 1) evaluating treatment threshold and variety and 2) the efficacy of a conventional and several reduced-risk insecticides on thrips numbers. Results showed that application of SpinTor® at either threshold did not reduce thrips numbers. However, there were significant differences among varieties. All of the reduced-risk compounds had significantly fewer thrips larvae per flower than the control two days after the third application.

Roubos, C. R. & O. E. Liburd. **Distribution of blueberry gall midge in rabbiteye blueberries and evaluation of emergence traps.**

We evaluated three trap types for monitoring blueberry gall midge, *Dasineura oxycoccana* Johnson, a key pest of rabbiteye blueberries (*Vaccinium ashei*). The Petri dish trap captured significantly more midge adults than the glass jar or plastic lid trap. In order to investigate midge distribution buds were collected from three different areas in a blueberry plot: border with vegetation, plot center, and border without vegetation. Significantly fewer midges were recorded in areas without vegetation.

Sandhu, H. G. Nuessly, S. Webb, R. Cherry & R. Gilbert. **Life cycle of lesser cornstalk borer, *Elasmopalpus lignosellus* Zeller (Lepidoptera: Pyralidae), on sugarcane.**

Lesser cornstalk borer developed from egg to adult in 33.4 d on sugarcane under controlled environmental conditions at 24 °C. Pre-oviposition, oviposition, and post-oviposition periods were 3.2, 4.1, and 2.9 d, respectively. Eggs were deposited singly on leaves, stems, and in the soil. First instar larvae fed on epidermal tissues of leaves and stems. Second instar larvae moved to the soil and bored into shoots from silken tunnels they produced beneath the soil surface.

Sethi, A., H. J. McAuslane, H. T. Alborn, R. T. Nagata & G. S. Nuessly. **Feeding deterrents for banded cucumber beetle (Coleoptera: Chrysomelidae) in latex of a resistant romaine lettuce.**

'Valmaine' romaine lettuce is resistant to feeding by banded cucumber beetle, beet armyworm and cabbage looper. 'Valmaine' latex strongly inhibits banded cucumber beetle feeding when applied to the surface of artificial diet. Solvent extraction and bioassay-directed fractionation of 'Valmaine' latex is being pursued to identify the chemical compounds underlying resistance.

Taylor, J. & D. Schuster. **A preliminary evaluation of silverleaf whitefly and *Tomato Yellow Leaf Curl Virus* (TYLCV) in tomato using geographical information systems.**

The silverleaf whitefly, *Bemisia argentifolii* (also known as biotype B of the sweetpotato whitefly, *B. tabaci*), is the key insect pest of tomato in southern Florida. Most damage associated with the whitefly is due to the transmission of plant viruses, the most damaging of which is *Tomato yellow leaf curl virus* (TYLCV). Reported is a

preliminary evaluation of the capabilities of geographic information systems (GIS) and global positioning systems (GPS) to map adult whitefly density and TYLCV incidence.

DISPLAYS

Bentley, M. & J. Ellis. **University of Florida Entomology and Nematology Department's Education and Outreach Program: bringing children and insects together. (posterpdf)**

The University of Florida Entomology/Nematology Outreach Program has developed a user-friendly education package facilitating insect education for grades K-5. This versatile package includes a 30-slide PowerPoint presentation and complimentary script as well as EDIS publications detailing rearing guidelines for several common Florida insects and a take-home antlion activity for youth.

Burton, M. S. & R. D. Cave. **Testing host food sources for laboratory rearing of *Lixadmontia franki* (Diptera: Tachinidae).**

Lixadmontia franki is currently being investigated as a biological control agent for *Metamasius callizona* in Florida. In order to produce large numbers of flies for field release, host food sources based on whole pineapple crowns, pineapple crown cores, ground pineapple, ground decomposed pineapple, ground *Tillandsia fasciculata,* and ground Spanish moss (*Tillandsia usneoides*) have been tested. Host survival is highest on ground pineapple but parasitism rates are greater on pineapple crowns.

Chavez, A. B., D. R. Gaskill, T. R. Smith & W. Dixon. **The Florida Cooperative Agricultural Pest Survey (CAPS) Program: survey monitoring and pest detection through GIS.**

The CAPS program has integrated GIS-related applications into several survey programs in order to target areas of high risk for exotic pest introductions. Collection and management of field data has improved with the use of ArcPad and Personal Digital Assistants (PDA). Our surveys and GIS-related processing methodologies have produced maps that support the implementation of sound pest detection strategies and assist regulatory decision-making. Detailed mapping of survey activities and results enhanced reporting accuracy and utility.

Edenfield, M. S. Krueger, R. Steffens. **Flubendiamide, a new lepidopteran-specific insecticide from Bayer CropScience.**

Flubendiamide is a new larvicidal lepidopteran-specific insecticide being developed by Bayer CropScience. Flubendiamide is the first member of a new chemical class, the phthalic acid diamides. The rapid cessation of feeding provides plant protection against a broad-range of economically important lepidopteran pests, including diamondback moth, loopers, and armyworms. The new mode of action that shows no cross-resistance and has minimal risk to beneficial arthropods.

Epsky, N. D., J. S. Sanchez, W. S. Montgomery & Paul E. Kendra. **Caribbean fruit fly, *Anastrepha suspensa* (Diptera: Tephritidae): life history and laboratory rearing methods. (posterpdf)**

The Caribbean fruit fly, *Anastrepha suspensa* (Loew), is an agricultural pest established throughout south Florida, where it poses a threat to commercial citrus, guava, and other tropical and subtropical fruit crops. This poster outlines the protocols used at the USDA-ARS laboratory in Miami, FL, for mass rearing of *A. suspensa* for research purposes. The poster also provides detailed photographic documentation of the developmental stages of the pest, from eggs to adult flies.

Fadamiro, H. Y., Y. Xiao, V. Umeh, T. Hargroder, M. Nesbitt & C. Childers. **Seasonal phenology of some key pests of Alabama Satsuma mandarin orchards.**

Satsuma mandarin production is an emerging industry in Alabama. However, little is known about the phenology of pests of this crop in Alabama. Surveys conducted from 2005-2006 in six Alabama orchards identified the following arthropods as key pests: citrus whitefly (*Dialeurodes citri*), purple scale (*Lepidosaphes beckii*), Glover scale (*L. gloveri*), citrus red mite (*Panonychus citri*), citrus rust mite (*Phyllocoptruta oleivora*), citrus leafminer (*Phyllocnistis citrella* Stainton), and leaffooted bugs (*Leptoglossus* spp.). The seasonal phenology of some of these pests is presented.

Gaskill, D. R., A. B. Chavez, M. Meadows, K. Griffiths, T. R. Smith, C. Welbourn & W. Dixon. **The Florida Cooperative Agricultural Pest Survey (CAPS) Program: red palm mite survey monitoring through GIS.**

The Cooperative Agricultural Pest Survey (CAPS) Program is working with FDACS and USDA to identify pathways for the introduction of the red palm mite (*Raoiella indica*) into Florida and to identify high risk sites to focus detection surveys. Geographic information was utilized in the field via ArcPad on Personal Digital Assistants (PDA). A total of 535 sites in 10 southern Florida counties were surveyed. Sentinel sites were established for future monitoring.

Gill, H. K., S. Singh, R. Sharma, V. K. Gupta & V. K. Dilawari. **Susceptibility and fitness cost of cotton bollworm *Helicoverpa armigera* (Hübner) associated with Cry 1Ac cry toxin.**

Changes in baseline susceptibility of populations of *H. armigera* to Cry 1Ac and impact of its continuous laboratory selection on target pest were evaluated. Survival data were further supported by molecular differences based on RAPD profile among populations, which established the existence of genetic variability among populations. There was only 1.70 to 2.71 fold increase in 2005 and 2006 to tolerance level of Cry 1Ac as compared to values from previous (2002) studies.

Hall, D. G., M. G. Hentz & R. Adair. **Phenology of *Diaphorina citri* in citrus in east-central Florida.**

Studies were conducted during 2005 and 2006 to assess population densities and phenology of the psyllid *Diaphorina citri* Kuwayama in Florida citrus. Young grapefruit and mature orange trees were sampled weekly for eggs, nymphs and adults. Immature and adult *D. citri* were consistently present and most abundant during May, June and July, but large infestations may occur at any time of the year depending on environmental factors and flush availability.

Hunter, W. B., X. H. Sinisterra, D. Achor & L. E. Hunnicutt. **Entomopathogenic virus entry and replication site in the glassy-winged sharpshooter, *Homalodisca vitripennis*. (Hemiptera: Cicadellidae). (posterpdf)**

The route of infection and replication of the leafhopper-infecting virus, HoCV-1, a newly described virus in the Dicistroviridae was elucidated in infected glassy-winged sharpshooter adults. Infected adult GWSS were dissected and their midgut tissues prepared for examination using transmission electron microscopy. In silico analysis of two cDNA libraries made from salivary glands, and midguts dissected from field collected GWSS were also examined to elucidate presence and replication of HoCV-1. The virus was observed in midgut tissues which also appear to be at least one of the tissues supporting virus replication. Viruses may serve a role in reducing GWSS vigor and population numbers in the field and are being evaluated for potential use as biological control agents.

Jackson, I., C. McCoy & L. Stelinski. **Effect of mating status and food on longevity and reproductive output of female *Diaprepes abbreviatus* under field conditions. (posterpdf)**

Female *Diaprepes abbreviatus* (L.) caged under field conditions with or without mating partners were either fed citrus flush ad libitum or unfed. If fed, mated and unmated females laid equal numbers of eggs, but female *D. abbreviatus* were not parthenogenic. Unfed females did not lay eggs. Field longevity of fed and unfed females was 80 and 20 days, respectively, regardless of mating status. The pre-oviposition and oviposition periods last ca. 20 and 50 days, respectively.

Kawano, S., T. Takushi, T. Toyozato, A. Ooshiro, M. Numazawa & K. Yasuda. **The simple and rapid diagnosis of citrus huanglongbing (Citrus greening) by Scratch method. (posterpdf)**

Citrus huanglongbing (HLB) caused by '*Candidatus* Liberibacter asiaticus', which is transmitted by *Diaphorina citri*, is one of the most destructive diseases in citrus growing areas of Okinawa Japan. It is difficult to identify HLB symptom from those of physiological disorder, or nourishment deficiency. We have demonstrated a rapid and simple diagnostic method (Scratch method), which detected starch in leaves by iodine-starch reaction, because it was revealed that starch granules accumulate abnormally in infected leaves.

Kendra, P. E., N. D. Epsky, A. Vázquez & R. R. Heath. **EAG and behavioral responses of the Caribbean fruit fly (Diptera: Tephritidae) to terminal diamines in a food-based lure. (posterpdf)**

Current monitoring programs for *Anastrepha* fruit flies utilize a food-based synthetic lure consisting of ammonium acetate and putrescine (1,4 diaminobutane). Identification of additional attractant chemicals may lead to development of a more effective trapping system. This study, conducted with the Caribbean fruit fly, *Anastrepha suspensa* (Loew), evaluated putrescine and four homologous diamines in terms of antennal response and field captures when combined with ammonium acetate lures.

Legaspi, J. C. **Life table analysis for *Cactoblastis cactorum* immatures and female adults under five constant temperatures.**

Laboratory life history studies of the cactus moth, *Cactoblastis cactorum*, were conducted at 18, 22, 26, 30 and 34 ºC. Duration of immature stages was generally longest at 18, declining significantly at 22 and shortest at 26, 30 and 34 ºC. Total immature development time from eggs to pupae was about 180 days at 18, 116 at 22 and ranged from 65 to 72 days at 26 to 34 ºC.

Leibee, G. L., L. S. Osborne, C. L. McKenzie & M. L. Kok-Yokomi. **Toxicity of Imidacloprid to *Bemisia tabaci* Type Q collected from Florida.**

A collection of *Bemisia tabaci* from *Hibiscus* in Florida in 2006 from a retail outlet was determined to be Type Q. A laboratory culture from this collection treated with imidacloprid plus cyfluthrin showed about 4000-fold resistance to imidacloprid compared to a reference culture of *B. tabaci* Type B. The resistance level increased significantly in the Type Q with additional exposure to the insecticide mixture.

Mann, R. S., P. S. Shera & J. Singh. **Seasonal abundance of insect pests of cotton.**

Abundance of insect pests of cotton was studied on unsprayed conventional cotton variety LH 1556 at Punjab Agricultural University, Ludhiana, India. There was not significant change in the pest and predator populations with the introduction of Bt cotton. Whitefly, jassid and spotted bollworm population remained active through out the cotton season. Pink bollworm, American bollworm, thrips and aphid population fluctuated between the years. Minor pests remained negligible.

Meagher, R. L. **Parasitoids of fall armyworm, *Spodoptera frugiperda*, in Florida.**

Fall armyworm, *Spodoptera frugiperda*, attacks a wide variety of host plants and is a serious pest of several crops in Florida. Although no one species is a major biological control agent, FAW does have a suite of parasitoids that may affect populations. These species include the braconids *Chelonus insularis* Cresson, *Cotesia marginiventris* (Cresson), and *Meteorus autographae* Muesebeck, the ichneumonids *Ophion flavidus* Brulle, the eulophid *Euplectrus platyhypenae* Howard, and the tachinid *Archytas marmoratus* (Townsend).

Morgan, A. L., D. R. Ring, A. R. Lax & F. S. Guillot. **2007 Status of pilot program using area-wide methodologies and integrated pest management of the Formosan subterranean termite in the French Quarter, New Orleans, Louisiana.**

The Formosan subterranean termite, *Coptotermes formosanus*, is a serious pest where it has become established and is one of the most destructive insects in Louisiana. A pilot test was begun in 1998 in the French Quarter to demonstrate the effectiveness of using area wide management to reduce densities of termites. All properties in a contiguous 15 block area in the French Quarter were treated using commercially available baits or non repellent termiticides. In 2002 the treatment zone was expanded to include the immediately surrounding blocks. Glue boards were used to estimate alate numbers and in-ground monitors for foraging activity. Alates were sampled once a week

in April and two to three times weekly during the flight season (May through July 15) in 1998 through 2006. Monthly monitoring of foraging activity began in January, 1999 to determine the number of stations with termites. An overall 50% reduction in termite numbers and activity was observed. Isolated areas of "high" termite activity remain inside the test area. Inspections of properties using infrared and acoustic detection technologies and visual inspections of courtyards and trees are being conducted to detect and treat termites. A third and fourth expansion began in 2003 and 2006, respectively. Continued treatment, expansion, and monitoring are required to assess the long-term effects of the area-wide management program.

Newsom, L., V. Pedibhotla, D. Calibeo-Hayes, J. Mitchell & T. Holt. **Alverde® (Metaflumizone) a novel BASF insecticide for control of key insect pests in vegetables.**

Metaflumizone, representing a new class (semicarbazone) of broad-spectrum insecticide from BASF and to be sold under the trade name Alverde® 2SC, is expected to be registered in the USA for use in 2007. Studies indicate that Alverde® controls insects harmful to Florida vegetable production including such species as *Plutella xyllostella, Pieris rapae*, *Manduca spp.*, *Trichoplusia ni*, and *Spodoptera spp*.

Nyoike, T. W. & O. E. Liburd. **Mulches and a reduced-risk insecticide influence whitefly population and incidences of *Cucurbit Leaf Crumple Virus* in zucchini squash.**

Cucurbit Leaf Crumple Virus (CuLCrV) is a whitefly-transmitted disease in Zucchini squash that was recently introduced to Florida. The effect of UV-reflective and living mulch (buckwheat) with and without Imidacloprid on the population dynamics of Bemisia tabaci, biotype B and their related problems was compared with white mulch (control). Mulches in combination with imidacloprid had lower whitefly population and consequently lower incidences of CuLCrV. Plants growing within synthetic mulches had higher yields than living mulch.

Renne, R. R. and E. McCord, Jr. ***Rhinocyllus conicus*, biological control agent of Canadian thistle, *Cirsium arvense*, acquires elk thistle, *Cirsium scariosum*, as a new host.**

The biological control agent, *Rhinocyllus conicus* (from France) was released in 1991 to control Canadian thistle (*Cirsium arvense*). In the summer of 2006, native Elk thistle (*Cirsium scariosum*) in Wyoming was found to host *R. conicus*. The adult weevils were abundant, eggs were deposited on the sides of the flower heads, and the larvae fed upon the interior of the flower heads inhibiting flowering and seed production. The weevils are probably responsible for the recent decline of Elk thistle.

Samayoa, A. C. and R. D. Cave. **The Sphingidae of Honduras.**

The family Sphingidae is represented in Honduras by 91 species, 44 of which are new country records. An overview of host plants, species richness in four national parks, and photographs of some species are presented.

Weathersbee III, A. A., R. G. Shatters, Jr., S. L. Lapointe & D. G. Hall. **Search, assessment and development of a BT gene-based strategy for resistance to *Diaprepes*.**

The Diaprepes root weevil (DRW) has been an agricultural pest in Florida for over 40 years. Since genetically engineered crops for insect control have emerged in a number of row crops, the possibility of engineering citrus rootstocks with resistance to DRW was pursued. The gene encoding the toxin gene from a *Bacillus thuringiensis* isolate was modified for optimal expression in plants. The modified gene was then inserted into both alfalfa and tobacco. These plants are currently being grown for characterization of BT toxin expression and testing against DRW larvae.

ORAL PRESENTATIONS

Cherry, R. & C. Rainbolt. **Effect of fallow period weed control on wireworm populations.**

During the fallow period between crops and replanting, some Florida growers use tillage, herbicides, or a combination of both to control weeds. Our data show that controlling weeds during fallow periods can result in reduced wireworm populations.

Duncan, R., J. Prena, and J. Peña. **Life history and larval morphology of *Eurhinus magnificus* Gyllenhal (Coleoptera: Curculionidae), a new weevil to the United States.**

Various aspects of the life history and host plant associations of *Eurhinus magnificus* Gyllenhal (Coleoptera: Curculionidae) were investigated. The pre-imaginal life stages of *E. magnificus* were described for the first time. All life stages of *E. magnificus* were collected at several sites in Broward and Miami-Dade counties from the host plant *Cissus verticillata* (L). Greenhouse studies were undertaken to determine *E. magnificus* development time and host specificity.

Durán-Martínez, E. P., J. M. Villegas-Mendoza & N. M. Rosas-García. **Predatory potential of *Cryptolaemus montrouzieri* (Coleoptera: Coccinellidae) on different stages of *Planococcus citri* (Hemiptera: Pseudococcidae) in laboratory tests.**

The mealybug destroyer beetle, *Cryptolaemus montrouzieri*, has been tested in laboratory conditions against *Planococcus citri* in order to determine predatory potential towards different stages of the citrus mealybug. Results indicate that adult *C. montrouzieri* feed all stages of *P. citri*, but crawlers are less preferred. Adults and third instar *C. montrouzieri* prefer second instar and third instar of female mealybug respectively. First instar *C. montrouzieri* is less voracious.

Eger, J. E., E. L. Vargo, T. R. Juba & F. J. Wessels. **Subterranean termites (*Reticulitermes* spp.) colony abundance and species composition in a north Florida longleaf pine orchard.**

Sentricon® stations provided with ESP™ monitoring devices were installed 1.5 m apart in a 20 x 20 station grid (30.5 x 30.5 m). The grid was located in a 7 year old longleaf pine orchard near Branford, FL. Termites were sampled monthly over one year.

Microsatellite markers were used to determine the number of colonies present and the foraging range for colonies. Three termite species were present, *Reticulitermes flavipes* (Kollar) *R. hageni* Banks and *R. virginicus* (Banks). Over 100 colonies were detected in this relatively small area and >95% of these were *R. hageni* Banks. Foraging ranges within this grid were small with a maximum of about 6.5 m for *R. hageni* and 8.6 m for *R. flavipes*. *Reticulitermes virginicus* occupied a single monitoring station.

Hahn, D. A., M. N. Rourke & Kathy R. Milne. **Mating affects the magnitude but not the timing of egg production in the flesh fly *Sarcophaga crassipalpis*.**

We investigated the effects of mating on the timing of egg maturation, egg size, egg number, and yolk protein production in our model for insect reproduction, the flesh fly *Sarcophaga crassipalpis*. There was no difference in the timing of egg clutch maturation between mated and unmated females, no difference in egg size, and mated females produced only slightly more eggs than unmated females (~12%) suggesting that mating effects flesh flies less than other models such as mosquitoes and *Drosophila*.

Hall, D. G., T. R. Gottwald, N. M. Chau, K. Ichinose, L. Q. Dien, & G.A.C. Beattie. **Intercropping of citrus and guava trees for management of Huanglongbing.**

Recent studies conducted in Viet Nam by Vietnamese, Japanese and Australian scientists indicate that interplanting citrus with guava negated infestations of Asian citrus psyllid and consequently huanglongbing, a serious disease caused by a bacterium vectored by the psyllid. Young citrus interplanted with guava remained disease-free for a year whereas a similar plot of citrus by itself showed signs of the disease within four months of planting and reached over 30% trees infected within a year. Observations supporting the guava effect were made in other Vietnamese groves where citrus and guava were intercropped. This presentation presents a summary of what is known about the guava effect in Viet Nam along with information gained during a trip made by USDA-ARS to Viet Nam during April 2007.

Haseeb, M., C. W. O'Brien, R. W. Flowers & M.T.K. Kairo. **Identification tool for weevil biological control agents of aquatic and terrestrial weeds in the United States and Canada.**

Delays in the implementation of biological control against salvinia and other targets underlie the important role of taxonomy. However, at a time when more taxonomists are needed, the discipline continues to decline. Now, a revolution in computer-based diagnostics is underway, that may result in replacement of traditional keys by matrix-based computerized tools. We have developed such a tool to identify weevil biological control agents of aquatic and terrestrial weeds in the United States and Canada.

Kaufman, P. E. & J. F. Butler. **Evaluation of the Mosquito Sentinel 360 Trap in Florida residential environments.**

The Mosquito Sentinel 360™ trap was evaluated in back yards of six residences in and near Gainesville, Florida. Modified CDC traps provided a measure of the effectiveness of the Mosquito Sentinel trap. Over 67,000 mosquitoes from 19 species were recovered over the 12 trial days. Of these species, *Anopheles crucians*, *An.*

quadrimaculatus, *Coquillettidia perturbans*, *Culex erraticus*, and *Mansonia titillans* were the predominant, nuisance and medically-important species recovered and accounted for >92% of specimens recovered.

Lapointe, S., D. Borchert & David Hall. **Climate mapping to predict spread of the root weevil *Diaprepes abbreviatus* and introduced natural enemies.**

Diaprepes abbreviatus colonized Florida southward but not northward since introduction into Lake County in 1964. Developmental thresholds were used to map distribution potential of *D. abbreviatus* and its egg parasitoids. Geographic areas with 15-20 d/yr with mean daily soil temperature $\leq$12°C approximated the northern limit. Egg parasitoids are limited to southern Florida with mean daily air temperatures <15°C <25 d/yr. We predict parasitoids will not establish in California or Texas due to winter air temperatures.

Leppla, N. C. & J. L. Gillett. **New from IPM Florida: the "Grower's IPM Guide for Florida tomato and pepper production".**

This UF/IFAS guide was produced to assist growers in planning their crops with up front decisions about pest prevention and management. It was designed to help growers transition toward more biologically intensive IPM. It will help growers reduce production costs while minimizing risks to human health and the environment. This guide is available at no cost on line for easy access by growers (http://ipm.ifas.ufl.edu/).

Mankin, R. W., P. Samson & K. Chandler. **Acoustic assessments of the severity of grub infestations in Queensland sugarcane fields.**

Effective management of sugarcane, Queensland's 2nd-most-important crop, currently requires the digging-up of large numbers of cane stools to estimate populations of *Dermolepida albohirtum* and *Antitrogus parvulus* grubs. In recent field tests, these relatively large, active grubs were easily detected by acoustic techniques. Efforts are in progress to develop methods of acoustically surveying fields to determine whether pesticide or other treatment is warranted.

Mann, R. S., P. E. Kaufman & J. F. Butler. **Response of *Lutzomyia spp.* to light emitting diode modified pickle jar traps.**

Pickle jar traps baited with CO_2 were modified for use with three light emitting diode colors. *Lutzomyia shannoni* and *L. vexator* were trapped between Oct 2006 to May 2007 at four sites in the San Felasco Hammock Preserve state park near Gainesville, FL. A total of 2716 sand flies were collected consisting 2081, *L. shannoni* and 635, *L. vexator* with an average of 6.29 total sand flies per trap per trap night.

Martínez-M., H., R. Rosas-Quijano & N. M. Rosas-García. **Characterization of microsatellite loci in *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae) from the state of Nayarit, Mexico.**

Maconellicoccus hirsutus is a serious pest, which has caused severe damage to mango and starfruit crops in Mexico, since its introduction to the country in 1999. In this work we found some microsatellite loci in the *M. hirsutus* genome, with motifs CG, CA, AAT and imperfect repeats which could be associated to selective pressure in this insect.

The goal is to find different alleles among populations to determine genetic variability according to geographic region.

Mizell, R., T. Northfield & C. Riddle. **Analyses of landscape level brown stink bug population dynamics using pheromone traps with geospatial and SADIE statistics.**

Pheromone-baited Florida stink bug traps were placed on a 399 square meter grid within a 1.6 square kilometer area in north Florida for 3 years. Weekly capture data of *Euschistus servus* and *E. tristigmus* were obtained. ArcView 9.2 and SADIE statistics were used to analyze the stink bug temporal and spatial distribution and abundance. Results will be discussed in light of known stink bug behavior and ecology and compared to similar data on glassy-winged sharpshooter.

Northfield, T., R. Mizell & C. Riddle. **Using multiple methods to analyze spatiotemporal dynamics of glassy-winged sharpshooters *Homalodisca vitripennis* at the landscape scale.**

Glassy-winged sharpshooter populations were monitored over a 1.6 square kilometer landscape over three years using yellow sticky traps arranged in a 399 square meter grid. ArcView 9.2, SADIE, and repeated measures statistics were used to analyze spatiotemporal dynamics in the landscape over three years. Seasonal changes in habitat use and the effects of environmental conditions on insect distributions will be evaluated and discussed in relation to the known biology and ecology of *H. vitripennis*.

Nuessly, G. S. & N. Larsen. **Effects of reduced phorate rates on wireworm damage to sugarcane.**

Five rates of phorate insecticide (0, 12.2, 14.6, 17.1 and 19.5 lb/ac) were tested for control of wireworms in mineral and organic soils in a greenhouse trial. Field conditions were simulated within 5-gal buckets, including planting depth, fertilizer and insecticide. Wireworm survival was reduced 50% over the check with the low phorate rate. Shoot damage decreased from 14 to <1% when phorate was increased from the low to the high rate.

Nuessly, G. S., N. Larsen & G. Goyal. **Picture winged flies (Ulidiidae) feeding on sweet corn in the Everglades Agricultural Area.**

Ulidiid flies in the genus *Euxesta* are maize pests throughout the tropics and into subtropical areas of the Americas. Representatives of three additional Ulidiidae genera are also known from southern Florida maize production areas. Pupae collected from ulidiid-infested ears sampled from fields within Everglades Agricultural Area were held for adult emergence. Collected species and their status at primary or secondary pests of maize will be discussed in relation to associations with other primary ear pests.

Qureshi, J. A. & P. A. Stansly. **Evaluation of rate, placement, and timing on effectiveness of Aldicarb applications for control of Asian citrus psyllid (Homoptera: Psyllidae) in citrus.**

The Asian citrus psyllid, *Diaphorina citri* Kuwayama is an economically important pest of citrus particularly in the regions where citrus greening or

Huanglongbing disease occurs. Psyllid vectors the bacterium *Liberobacter asiaticum*, causal organism of the disease. Sustainable management of the pest and disease warrants evaluation of potential biological and chemical means to contain psyllid populations. Aldicarb (Temik 15G) was applied at different rates to the bed side or bed and swale sides of the mature trees of citrus and evaluated for the effects on psyllid populations. Recommended rate was evaluated for application at different times before the initiation of spring flush to reduce the early season populations and the following generations of psyllid.

Ryser, B. & J. Ballard. **The efficacy of Transport® termiticide clearing subterranean termite infested structures in Louisiana.**

This presentation summarizes results of a three-year field development program treating subterranean termite infested buildings in Louisiana. Structures were conventionally treated using Transport ®, a novel non-repellent termiticide. All treatments were tracked using advanced detection equipment to determine the number of days to achieve control following application. Various treatment strategies were compared. Frequent inspection of treated structures verified the success of each treatment strategy.

Scheffrahn, R. H. and M. J. Weinberg. **The Asian subterranean termite in Key West – a legendary infestation in the making.**

The Asian subterranean termite, *Coptotermes gestroi* (Wasmann), is the most damaging exotic termite to become established in Florida in recent years. Discovered in Key West in 1999, the species is progressively advancing from the more recently developed east side of the island toward its historic western districts. Similar invasions by *C. gestroi* on Barbados and elsewhere portend that Key West will become saturated with this pest within 20 years.

Seal, D. R., A. Palmateer, W. Klassen & C. Sabines. **Control of chilli thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) by *Orius insidiosus* Say and entomopathogenic fungi, *Beauveria bassiana* and *Metarhizium anisopliae*.**

Orius insidiosus Say is a potentially useful predator of the chilli thrips, *Scirtothrips dorsalis* Hood. All developmental stages of *O. insidiosus* fed consistently on *S. dorsalis* larvae at the rate of 15-25 per day. In a free-choice situation, similar numbers of larvae of *Thrips palmi* Karny as of *S. dorsalis* were consumed by *O. insidiosus*. However, in a no-choice situation, *O. insidiosus* consumed more *T. palmi* larvae than *S. dorsalis* larvae. *Beauveria bassiana* and *Metarhizium anisopliae* provided significant reduction of chilli thrips; but the effectiveness of these entomopathogens was inconsistent in this study.

Shapiro, J. P., S. R. Reitz, P. D. Shirk & S. M. Ferkovich. **Nutrition for optimal predatory performance of adult female *Orius insidiosus*.**

Reproduction in a female predator, *Orius insidiosus*, is a nutritionally stringent process. Adult females acquire the nutrition needed for egg development from their prey, and rates of egg development are dependent on nutrients acquired in that life stage. When released as a biological control agent, the initial rates of prey seeking and

consumption are critical. Using a variety of methods, we are discovering optimal nutritional conditions to achieve high rates of these behaviors.

Stansly, P. A. & J. A. Qureshi. **Impact of dormant sprays on Asian citrus psyllid *Diaphorina citri* (Homoptera: Psyllidae) and its natural enemies in citrus.**

Asian citrus psyllid is a vector of greening or huanglongbing, a devastating disease of citrus spreading throughout Florida. The psyllid can only reproduce on young flush and overwinters as an adult in citrus feeding on mature foliage. Dormant sprays of broad spectrum insecticides are proving effective in reducing overwintering populations while conserving natural enemies absent or cryptic during winter. This strategy is providing pest suppression for many months with apparently minimal ecological liability.

Stelinski, L. and M. Rogers. **Potential for mating disruption of citrus leafminer, *Phyllocnistis citrella*.**

The complete female sex-attractant pheromone of the citrus leafminer, *Phyllocnistis citrella*, was identified in 2006. Mating disruption is the control practice of deploying synthetic pheromone into a crop atmosphere to disrupt mate finding. Orientation of male *P. citrella* to pheromone-baited sticky traps was effectively disrupted by deploying pheromone at a dosage per hectare that may be economically feasible for leafminer control in citrus. Flush infestation in pheromone-treated plots was reduced compared with untreated controls.

Story, R., A. Hammond & J. Murray. **Efficacy of rootworm and white grub control practices used by sweet potato growers in Louisiana.**

Virtually 100% of the sweet potato acreage in Louisiana is treated with preplant, soil incorporated insecticides, followed by several foliar applied insecticides through the season. The damage levels due to rootworms and white grubs in untreated strip plots over a 3 year period will be presented, the limited efficacy of the insecticides used by growers will be shown, and our efforts to improve both the timing of application and the selection of insecticides growers make will be discussed.

Thoms, E. **An overlooked control method for a forgotten, but re-emerging pest - use of Vikane® gas fumigant for localized eradication of bed bugs, *Cimex lectularius*.**

The common bed bug, *Cimex lectularius*, rarely found in the US during the last 50 years, has made a resurgence as a pest of homes, apartments, hotels, dormitories, and long-term health care facilities. According to the National Pest Management Association, bed bug complaints in the US have increased 50-fold over the last five years.
The current challenge of eradicating bed bugs in buildings is well documented. Treatments require intensive inspections, extensive sanitation, repeated applications of residual insecticides, steam or heat treatments, and often discarding of infested mattresses and upholstered furnishings. Vikane® gas fumigant (active ingredient, sulfuryl fluoride; Dow AgroSciences, Indianapolis, IN) can reliably eradicate bed bug infestations with one stand-alone treatment at 3-fold the drywood termite dosage rate. In addition to whole structure fumigation, the presentation will review novel ways to fumigate infested

furnishings and household items for bed bugs that would not require evacuation of infested buildings.

Wenninger, E. J. & D. G. Hall. **Daily timing of and age at mating in the Asian citrus psyllid, *Diaphorina citri* (Hemiptera: Psyllidae).**

We examined the basic reproductive biology and behavior of *Diaphorina citri*, a vector of citrus greening disease (huanglongbing). Both sexes reach reproductive maturity at 2-3 d post-eclosion, and oviposition generally begins within 1 d after mating. Mating on orange jasmine was observed almost exclusively on flush shoots and only during photophase, with no obvious peak of daily mating activity. Mating may be constrained during scotophase by both lower temperatures and darkness.

Xavier, N. & A.M. Handler. **Dominant temperature sensitive genes for conditional lethality in transgenic fruit flies.**

We have isolated and mutated two 20S proteasome subunit genes from the caribfly, *Anastrepha suspensa* to create dominant temperature sensitive mutations that result in larval/pupal lethality when genetically transformed individuals are reared at 30°C. These conditionally lethal transgenes will be used to develop new strategies for the biological control of tephritid fruit fly pests.

Yasuda, K. & S. Kawano. **Occurrence and control measures of citrus huanglongbing in Okinawa Japan.**

In Japan, citrus huanglongbing (HLB) was recognized first on Iriomote Island in Okinawa Prefecture in 1988. Moreover, citrus psyllid (*Diaphorina citri*), it is known that the vector insect expanded to the north (Kyushu mainland Japan) in 2006. We introduce the current status of HLB in Okinawa Prefecture: 1) Quarantine system, 2) Controlling system, 3) Indexing and felling of an infected tree, 4) Controlling measures against citrus psyllids.

Zimowska, G. J. & A.M. Handler. **Testis-specific expression of fluorescent proteins for sperm identification in transgenic fruit flies.**

We have isolated the testis-specific *b2-tubulin* gene or its 5' promoter region from the caribfly, *Anastrepha suspensa*, the mexfly *A. ludens,* and the oriental fruit fly, *Bactrocera dorsalis*. The promoter regions of these genes were linked to the DsRed fluorescent protein gene and transformed into the caribfly and medfly to allow sperm identification in mated females. These promoters also have potential use for male sterility, and potentially, genetic sexing.

SYMPOSIA

Barnes, D. & J. D. Ellis. **How we identify Africanized Honey Bees: use of the FABIS and USDA AHB morphometric tests.**

One of the most common questions asked by the public is "how do you identify the Africanized honey bee from feral European honey bees?" The answer is FABIS (Fast Africanized Bee Identification System) and the much longer but more comprehensive

USDA Morphometric test. Both methods will be described and explained, as well as representative biochemical methods.

Boykin, L. M., R. G. Shatters, Jr., D. G. Hall, C. L. McKenzie, W. B. Hunter, R. A. Bagnall, D. R. Frohlich, C. S. Katsar, R. C. Rosell & P. DeBarro. **A Bioinformatic approach to studying invasive insects: two case studies *Bemisia tabaci* and *Diaphorina citri*.**

Our unit is involved in studying sub-tropical invasive insects that threaten citrus and ornamentals in Florida. We show the utility of using genetic data and bioinformatics tools to answer practical questions. Two studies will be highlighted, our global phylogenetic relationships of the *B. tabaci* species complex and our recent collection of microsatellite data from *D. citri*. Questions that can be answered using these tools are as follows: 1) What is the population genetic diversity of global a particular invasive insect? 2) How does the global diversity compare to the diversity found in Florida? 3) Is there gene flow between global populations of the species of interest? 4) What are the migration/introduction patterns of the invasive insect into Florida? The answers to these questions will help with management of the invasive insects.

Devlin, D. **Microsatellites and a parasitic beetle (*Coccotrypes rhizophorae*).**

The scolytid beetle, *Coccotrypes rhizophorae* has a plays a key role in the demographic structure of its obligate host, the Red Mangrove (*Rhizophora mangle*) in Florida. Although highly vulnerable to storms, *Coccotrypes* is a superior colonizer of mangrove islands and hurricane disturbed forests. The pattern of gene flow and whether recruitment is dependent on the host plant is unknown. I am using Microsatellites to elucidate the genetic structure and of *C. rhizophorae* in Florida.

Ellis, J. D. **An introduction to Africanized honey bees, *Apis mellifera scutellata*.**

The Africanized Honey Bees, *Apis mellifera scutellata*, is behaviorally and biologically different than European derived subspecies. Insights into AHB behaviors seen in Southern Africa explain behaviors seen in Florida and the western hemisphere.

Funderburk, J. E., C. Mellinger & T. Weiss. **Spinosad resistance management strategies.**

Spinosad is utilized worldwide against *Frankliniella occidentalis* in agronomic, horticultural, and vegetable crops. Resistance previously has been documented for greenhouse populations. This paper will report results from assays conducted against field populations in the continental U. S. Resistant field populations have been identified in Florida and California. Resistance appears to be manageable at this time and efforts are underway to encourage growers to adopt integrated pest management.

Hayes, J. **Current status of Africanized honey bees in Florida: 2007.**

The Africanized Honey Bee was recognized as established in Florida in 2005. Interception of AHB swarms arriving on ships from Central America and the Caribbean occurred for many years before that. The current status and distribution of AHB in

Florida will be described. A review of stinging incidents will also be provided as an indication of potential threat to Florida Residents and visitors.

Hayes, J. & J. D. Ellis. **Colony collapse disorder update.**

The rapid decline and loss of millions of domesticated managed honey bee colonies in the Fall of 2006 has cause a lot of concern in both North America and Europe. What are the current hypotheses and data on potential causes? The most current information will be presented. Other threats to managed honey bee colonies in Florida will also be discussed.

Hodges, A. **Florida's role in the Southern Plant Diagnostic Network (SPDN).**

The Southern Plant Diagnostic Network (SPDN) http://spdn.ifas.ufl.edu/, funded by USDA-CSREES in June of 2002, is coordinated by the University of Florida/IFAS Extension. The mission of the SPDN focuses on assisting in the early detection of exotic pests and is accomplished primarily through 1) diagnostics 2) educational training sessions 3) response exercise scenarios and 4) other general networking/communications activities. A brief summary of SPDN accomplishments, and also highlights regarding Florida-specific activities will be presented.

Hoy, M. A., A. Jeyaprakash, D. Clarke-Harris & L. Rhodes. **DNA analysis of the establishment of a parasitoid of the brown citrus aphid.**

The brown citrus aphid, *Toxoptera citricida* (Kirkaldy), is a serious pest of citrus because it efficiently transmits citrus tristeza closterovirus (CTV). The invasion of Jamaica's citrus by *T. citricida* resulted in serious economic losses. A program to develop improved CTV management tools included consideration of the importation and establishment of *Lipolexis oregmae* Gahan (Hymenoptera: Aphidiidae) in a classical biological control program. Prior to introducing *L. oregmae*, we conducted a survey to determine whether *Lysiphlebus testaceipes* Cresson (Hymenoptera: Aphidiidae) was parasitizing *T. citricida*. A High-fidelity PCR analysis was conducted using *Lysiphlebus*- and *Lipolexis*-specific ITS2 rRNA primers on brown citrus aphids and the results were positive for both parasitoids. The presence of *L. oregmae* in Jamaica was surprising, and was confirmed by rearing adults from parasitized aphids and obtaining taxonomic confirmation. Additional confirmation of its identity was obtained by comparing 16S, 12S, and COI sequences from the Florida colony of *L. oregmae* and from Jamaican specimens, with 100% sequence identity found in all three genes. During 2005, an island-wide survey of citrus in six parishes confirmed that both *L. testaceipes* and *L. oregmae* were common in *T. citricida*, but that *L. oregmae* was the more widely distributed and abundant parasitoid.

Kern, Jr., W. H. **Colony structure and behavior as an indication of level of Africanization in *Apis mellifera*.**

While Africanized and European honey bees are indistinguishable visually, is it possible to use colony location or structure to help differentiate AHB from EHB in the field? Analysis of colony locations were correlated with either FABIS or USDA morphometric results. Are certain colony locations only associated with one strain or the

other? Can this be used to selectively control AHB and AHB hybrid colonies while protecting feral European colonies?

Nagoshi, R. **Using haplotypes to monitor the migration of fall armyworm in North America.**

We used mitochondrial haplotypes to develop a rapid means of distinguishing fall armyworm (*Spodoptera frugiperda*) populations originating from Texas and Florida that provides an opportunity for investigating the long-range movements of this important agricultural pest. This method was used to derive a preliminary map of the movements of fall armyworm during their annual northward migration.

Newsom, L., D. Calibeo-Hayes & T. Holt. **Siesta® (Metaflumizone) a new fire ant bait from BASF.**

Siesta®, with the active ingredient metaflumizone, represents a new class (semicarbazone) of broad-spectrum insecticide from BASF. Siesta® is a fire ant bait which controls ants primarily by ingestion and has limited contact activity. Once consumed, metaflumizone acts on the voltage dependent sodium channel by blocking the flow of sodium ions. Siesta® effectively controls ants in the genus *Solenopsis*.

Roda, A.L. **Red palm mite: new pest threatening Florida's palms and prospects for biological control.**

The red palm mite (*Raoiella indica*, Tenuipalpidae), a pest of coconuts and ornamental palms in Asia and Africa, arrived in the Caribbean in 2004. By 2007, it had spread to at least eleven islands, including Puerto Rico. Populations of the mite are extremely high and it is attacking new hosts such as bananas, gingers and heliconias. Biocontrol and pesticide options are being studied to manage the pest locally and prevent its spread to the US.

Rodrigues, J.C.V., J. E. Peña & A. Roda. **Efficacy of acaricides against the red palm mite, *Raoiella indica* (Tenuipalpidae) in Puerto Rico.**

The red palm mite, *Raoiella indica* Hirst., also known as the coconut mite, coconut red mite, red date palm mite, leaflet false spider mite, frond crimson mite, and scarlet mite is an important pest of coconuts, date palms, and other palm species as well as a pest of bananas, beans, and durian in different parts of the world. During 2005, the mite was found in Dominica and during 2006 on the islands of Trinidad and Tobago, Guadeloupe, Puerto Rico and Saint Martin infesting palms, banana, ginger, bird of paradise and other plants within the family Musaceae. *Raoiella indica* causes severe leaf yellowing and necrosis. There is no data on pesticide efficacy for mite pests in bananas in Florida and/or Puerto Rico. Our objectives were to determine the efficacy of acaricides against *R. indica* and to provide palm, banana and ornamental nursery growers with an updated list of acaricides with good control potential.

Rogers, D. **IRAC-US and neonicotinoid resistance management recommendations.**

IRAC, the Insecticide Resistance Action Committee is a consortium of crop protection industry scientists whose mission is to work with customers and stakeholders

at each level to keep all classes of insecticides and acaricides as viable control options. IRAC is associated with CropLife as a technical advisory group and is involved at an International and Local Country levels. Discussions will include mission statement and objectives as well as recent activities of the Education and Neonicotinoid sub-committees, recently revised mode of action table, mode of action labeling recommendations on products and plans for future activities.

Shatters, Jr., R. G., P. Hall, L. M. Boykin & C. L. McKenzie. **Using population bioinformatics to study the dynamics and relationships of invasive *Bemisia tabaci* biotype populations that have entered the U.S**.

Bemisia tabaci is a worldwide pest insect with evolutionarily divergent biotypes present on all continents with the exception of Antarctica. Current phylogenetic research suggests geographical distinct biotypes existed until human movement of infested plant material. As a result of this human activity, two major *B. tabaci* biotypes, B and Q, have broken out of their original geographic range and spread worldwide. The B biotype appeared in the U.S. in the early 1980s and rapidly out competed the native A biotype on field crops in the southern states and in greenhouses throughout the country. Within the last two years, the Q biotype has been detected in greenhouse operations throughout the U.S. and has caused increased problems in crop production because of its greater resistance to pesticides classically used to control the B biotype. The Q and the B biotypes arose out of difference regions of the Mediterranean and are known to be closely related; however, the degree to which these biotypes are related remains unclear. Genetic fingerprinting studies based on the use of microsatellite markers within the populations of B and Q collected throughout the U.S. and other countries shows that there is no genetic exchange between these biotypes. This finding supports the growing belief that the two biotypes are best defined as separate species. Furthermore, analysis of the population relationships using the STRUCTURE^{tm} program, showed that the genetic complexity of the B and Q populations is vastly different in comparison. Of all the B biotype individuals collected throughout the U.S. and worldwide, the best description of the genetic relationships is that they represent one large population. On the other hand, the Q biotype displayed much more complex genetic structure that could only be defined by multiple worldwide populations. Data will be presented to show the genetic structure of the B and Q biotypes within the U.S. populations and described with respect to the aggressive nature of these pest insects.

Sherrod, D. W., S. Royal, P. Marcon, F. W. Marmor & H. E. Portillo. **Coragen™ (DPX-E2Y45): a novel anthranilic diamide insecticide (chlorantraniliprole) for the control of fruiting and leafy vegetable pests.**

Studies to-date with DuPont™ Rynaxypyr™ have demonstrated broad spectrum control of chewing insects in top fruit, vegetables, grapes, potatoes, rice, and other specialty and field crops. RYNAXYPYR™ will be available under the trade name of CORAGEN™ in vegetable crops.

Toapanta, M. A., J. Bell, D. Schuster, R. Steffens, R. Nauen & A. Elbert. **MOVENTO®, a new systemic insecticide for sucking insect pest management from Bayer CropScience.**

MOVENTO® (Spirotetramat) is a novel, systemic insecticide that provides excellent control of various sucking pests infesting both annual and perennial crops. With a unique mode of action that shows no cross-resistance to currently available chemical classes, MOVENTO will serve as a powerful tool in both resistance management and IPM programs.

Weiss, T., C. Mellinger & J. Funderburk. **Resistance of field populations of *Frankliniella occidentalis* to Spinosad.**

Resistance to field populations of *Frankliniella occidentalis* to spinosad has been discovered in southeast Florida. Appropriate resistance management practices must be adopted in order to stop the spread of this resistance and to allow reversion to a susceptible population.