Abstracts and Author Index of the 2005 Florida Entomological Society Annual Meeting Presentations

Pioneer Lecture

W. W. Yothers: A Pioneer in Citrus Entomology.

William Walter Yothers, known as W. W. Yothers throughout his career, obtained a BS from Idaho University in 1903 and an AB from Cornell in 1904. His USDA career began in 1904 in Texas, working on the cotton boll weevil. In 1907, Mr. Yothers joined the USDA citrus laboratory in Orlando and focused his research on citrus whitefly. He became the entomologist in charge in 1910. His research eventually was expanded to include all citrus insects and mites. He developed a spraying scheme to control citrus rust mites and scale insects. His scheme has evolved into the citrus spray and dust guide published annually by the extension service. Mr. Yothers published numerous bulletins and circulars on citrus insects and mites. He was a charter member of the Florida Entomological Society and served as president in 1927. He was also a member of the Florida Horticultural Society. Mr. Yothers remained active following his retirement from the USDA in 1935, becoming a consultant to chemical companies and citrus associations. He also owned citrus groves and was named to the Citrus Hall of Fame.

2005 Pioneer Lecturer. **Allen G. Selhime**, USDA Research Leader (ret.)

Allen G. Selhime received a BS in entomology from Colorado State University in 1950. He began his career as a research entomologist with the USDA in 1951. Research on citrus insects and mites began in 1953. Research efforts included both chemical and biological controls. Selhime became research leader for the Orlando Horticultural Laboratory in 1964 and kept this assignment until his retirement in 1984. A member of the Florida Entomological Society, he served as president in 1973, and was elected as a honorary member in 1987. Selhime had a significant role in two successful biological control efforts; one against Florida red scale and the second against citrus blackfly. The citrus blackfly success was recognized in 1981 by the USDA awarding the distinguished service award to the two USDA labs cooperating in the study. One was the USDA lab in Weslaco, Texas and the other the Orlando, Florida lab. W.G. Hart and A.G. Selhime were the two principal investigators named.

DSP 1. Semi-artificial rearing system for the pepper weevil, *Anthonomus eugenii* Cano. **Karla M. Addesso** and Heather J. McAuslane. University of Florida, Entomology & Nematology Department, P.O. Box 110620, Gainesville, FL 32611-0620

The pepper weevil, *Anthonomus eugenii* Cano, is a serious pest of cultivated peppers in the southern United States. Currently, a braconid parasitoid is being investigated as a possible biological control agent. Efficient mass rearing of the parasitoid depends on the effectiveness of the host rearing system. In an effort to minimize the dependence of pepper weevil rearing on fresh peppers, larval development and female oviposition behavior were investigated in artificial and semi-artificial systems.

DSP 2. Genitalic identification of *Spodoptera* moths (Lepidoptera: Noctuidae) trapped in Florida with *S. litura* pheromone lures, and how to distinguish them from *S. litura* and *S. littoralis*, two exotic species. **Julieta Brambila**. USDA-APHIS-PPQ, P.O. Box 147100, Gainesville, FL 32614-7100

Pheromone traps are being used to survey for 2 species of *Spodoptera* moths not established in the United States. *Spodoptera dolichos* (Fabricius) and *S. ornithogalli* (Guenee), two of the 10 species of *Spodoptera* moths known to occur in the United States, are regularly caught in these traps in Florida. Genitalic characters need to be examined for species identification because wing color patterns of the four species are extremely similar and variable and because the wings of specimens collected in pheromone traps, especially sticky traps, are often damaged.

DSP 3. Citrus greening disease in Florida: Monitoring high risk areas through GIS and demographic census data. **Andrea B. Chavez**, Eduardo M. Varona, and Brett Miller. FDACS-DPI-CAPS, 1911 SW 34th Street, Gainesville, FL 32608

The Asian citrus psyllid is the primary vector for the Asian strain of citrus greening disease, not yet found in the U.S. However, the primary vector is established in Florida and the CAPS Program has conducted six citrus greening monitoring surveys in the state. Survey efforts included GIS-related processing methodologies of potentially high risk tree zones where the disease would most likely be found.

DSP 4. Effect of solasodine on feeding behavior and oviposition of *Anthonomus tenebrosus* (Coleoptera: Curculionidae), a potential biological control agent of tropical soda apple, *Solanum viarum.* **Bobbie Jo Davis**, Julio Medal, James Cuda, and Frank Slansky, Jr. UF - Entomology & Nematology Department, Bldg. 970, Natural Area Drive, Rm. 2118, P.O. Box 110620, Gainesville, FL 32611-0620

Trace amounts of the steroidal glycoalkaloid solasodine are found in the young leaves of Solanum viarum fed upon by *Anthonomus tenebrosus*. Solasodine was evaluated as an attractant for *A. tenebrosus.* Solasodine concentrations of 0.03%, 0.09%, and 0.27% added to an artificial diet were based on amounts found in the foliage of various Solanum species. Adult feeding behavior, oviposition, fecundity, and mortality were recorded in laboratory trials.

DSP 5. Defoliator pests of plantain (*Musa* AAB, sub-group plantain cv. Hartón) in western Venezuela. **Oscar Domínguez**, Raúl Ramírez, Eleodoro Inciarte, and M. Esther Burgos. Unidad Técnica Fitosanitaria, Facultad de Agronomía, La Universidad del Zulia, Maracaibo, Venezuela.

Banana and Plantain (*Musa* spp.) are one of the most important crops grown in Venezuela. Defoliators have been one of the most important pests in these crops. Since November 1995 a faunistic study was carried out on 32 production units (Francisco Javier Pulgar, Colón and Baralt counties of Zulia state) to determine the lepidopteran pest species associated to plantain. Twenty-six genera of defoliators were identified representing twelve families of Lepidoptera and one Coleoptera, such as: *Antichloris viridis, Caligo memnon, Opsiphanes tamarindi, Automeris incarnata, Apatelodes* sp. and the Chrysomelidae (Eumolpinae) *Allocolaspis insidiosa.*

DSP 6. Development of a pheromone-based synthetic attractant for the cactus moth. **N. D. Epsky,** B. D. Dueben, S. D. Hight, J. E. Carpenter, P.E.A. Teal, and R. R. Heath. USDA/ARS, SHRS, 13601 Old Cutler Rd., Miami, FL 33158

Chemical components of the female-produced pheromone were determined by extracting abdominal glands and by collecting volatile chemicals from calling females. Laboratory bioassays using olfactometers and flight tunnels determined that a three component blend was effective in producing a response in virgin male moths. Field tests were used to evaluate male response to traps baited with lures formulated at different dosages and blend ratios in comparison with traps baited with live virgin females.

DSP 7. An expert/information system: Weevil biological control agents of aquatic and terrestrial weeds in the United States and Canada. **M. Haseeb**, C.W. O'Brien, and R.W. Flowers. Center for Biological Control, Florida A&M University, Tallahassee, FL 32307-4100

Aquatic and terrestrial weed managers need to be able to identify weevil biocontrol agents. This requires access to quality identification tools and techniques. Using diagnostic characters of 40 species in 28 genera of beneficial weevils, and high quality Auto-Montage 3D images, we have developed a computer based Expert/Information System to aid in identifying these weevils. Also provided is detailed information on each species including biology, hosts, collection techniques, specific damage and overall damage.

DSP 8. From bugs to bases: Determining function, related pathways, and cellular location of gene products through EST annotation. **Laura E. Hunnicutt** and Wayne B. Hunter. USDA ARS USHRL, Subtropical Insects Research Unit, 2001 S. Rock Rd., Ft. Pierce, FL 34945

The primary goal of our lab is to gain insight into the transcriptome of economically important insects. A large part of our efforts thus far have focused on the clustering and assemblage of EST sequencing projects derived from whole-insect and tissue-specific cDNA libraries encompassing genera within the Hemiptera, Homoptera, Hymenoptera, and Coleoptera. The ESTs were subsequently annotated using an array of publicly-available databases to correlate each sequence with a comprehensive ontology which integrates a putative molecular function, biological process, and cellular component. Compilation of transcriptome surveys such as this are vital to the identification of genes that play key roles in insect growth and development, reproductive physiology, behavior, pathogen-vector interactions, and stress response. Armed with this information, we are able to develop novel pest management strategies that will 'down-regulate' gene expression thereby reducing or inhibiting the action of targeted genes.

DSP 9. Reducing glassy-winged sharpshooters using insect-infecting viruses, *Homalodisca coagulata* (Say) (Hemiptera: Cicadellidae). **Wayne B. Hunter**, Ute Albrecht, and Diann Achor. United States Horticultural Research Lab, USDA-ARS, Subtropical Insect Research Unit, Fort Pierce, FL, 34945

Pierce's Disease of grapes, which is caused by the bacterial pathogen *Xylella fastidiosa*, threatens the national viticulture industry. The glassy-winged sharpshooter is the primary vector of Pierces Disease due to a larger host range, larger size and ability to fly long distances, and the ability to transmit multiple strains of *Xylella.* Insect viral pathogens of leafhoppers have yet to be examined as potential microbial control agents. Results: GWSS adults were successfully infected with Whitefly Iridovirus, WFIV that had been propagated in *Trichoplusia ni* larvae. Virus infection caused reduced longevity and fecundity of GWSS. Adults were infected by microinjection and sprays. Infected individuals transmitted the virus to 'healthy' cohorts when caged together, suggesting an aerosol mode of transmission. Detection of virus positive eggs suggests that WFIV may also have a transovarial mode of transmission.

DSP 10. Molecular characterization of Δ9 desaturase 1 from the glassy-winged sharpshooter, *Homalodisca coagulata* (Hemiptera: Cicadellidae). **C.S. Katsar**, W.B. Hunter, P. Dang, and C. A. Cleland. Subtropical Insect Research Unit, United States Horticultural Research Lab, USDA-ARS, Fort Pierce, FL, 34945

We report the isolation and characterization of a Δ9 desaturase from the glassy-winged sharpshooter, *Homalodisca coagulata* (Hemiptera). The cDNA isolated encodes for a 367 amino acid belonging to Family 1 of ProDomain fatty acid desaturases. Conserved motifs and *in silico* analyses confirm this protein is a Stearoyl-CoA Δ9 desaturase-1 with a preference for a 16-carbon substrate. The protein appears to have three structural domains and sustains no significant homology with previously established desaturase crystalline structures.

DSP 11. Delta-9 desaturase from the *Diaprepes* root weevil. **C.S. Katsar**, W.B. Hunter, and S.L. Lapointe. Subtropical Insect Research Unit, United States Horticultural Research Lab, USDA-ARS, Fort Pierce, FL, 34945

Diaprepes root weevils, DRW, cost citriculture millions of dollars in lost production. DRW has spread to Texas, and is a threat to California agriculture. New strategies to monitor and limit damage to crops are needed. More effective trapping and management strategies depend upon identification of attractants or pheromones for this species. A full length cDNA was cloned and characterized from the DRW and the protein characterized *in silico* to determine if pheromone precursors were present.

DSP 12. Molecular Analysis of capsid protein of *Homalodisca Coagulata* Virus-1. A new virus from the glassy-winged sharpshooter, *Homalodisca coagulata* (Say) (Hemiptera: Cicadellidae). **C.S. Katsar**, W.B. Hunter, P.M. Dang, and J.X. Chaparro. USDA-ARS Horticultural Research Lab, 2001 South Rock Road, Fort Pierce, FL 34982

Capsid proteins have been shown to be a suitable templates for phylogenetic studies in viruses. A new insect infecting virus, isolated from the glassy-winged sharpshooter, thus named, *Homalodisca Coagulata Virus-1* (HoCV-1) is related to members within the Dicistroviridae, and appears to form a new clade within the within the newly recognized genus *Cripavirus*. HoCV-1 increases sharpshooter mortality by ~20%. Structural Analysis of the HoCV-1 capsid protein identified significant structural homology with established *Cripavirus* crystalline structures.

DSP 13. A rice dwarf-like virus isolated from the salivary gland of the glassy-winged sharpshooter, the vector of Pierce's disease of grapes. **C.S. Katsar**, and W.B. Hunter. Subtropical Insect Research Unit, United States Horticultural Research Lab, USDA-ARS, Fort Pierce, FL, 34945

The Reoviridae are large, architecturally-complex viruses containing segmented double-stranded RNA genomes that infect plant hosts through insect vectors. Rice Dwarf Virus (RDV) is a leafhopper-transmitted member of the Phytoreoviridae that infects graminaceous hosts. Since the Glassy-winged sharpshooter, GWSS, Homalodisca coagulata, has become established in California it has drawn attention as the main vector of Pierce's Disease of grapes, however, recent findings suggest that other crops are also at risk from this fast spreading insect pest. A Rice Dwarf-like virus was isolated from the salivary gland of the GWSS. The presence of Rice Dwarf-like virus indicates that the GWSS may be causing more economic damage than just as a vector of Pierce's Disease, and expanded monitoring in other crops that are susceptible to RDV and related viruses would be prudent

DSP 14. Phylogenetic analysis of delta-9 desaturases within the Hemiptera. **C.S. Katsar** and W.B. Hunter. Subtropical Insect Research Unit, United States Horticultural Research Lab, USDA-ARS, Fort Pierce, FL, 34945

Fatty acid desaturases are subdivided into two families. The first family comprises the Stearoyl-CoA desaturases (SCD), while the second family is comprised of the Stearoyl-Acyl Carrier proteins. Amino acid sequences, conserved functional motifs, and *in silico* analyses phylogenetic analyses delineate the Δ9 desaturases 1 within the Hemiptera into distinct clades with specific catalytic functions.

DSP 15. Sharpshooter herbivory: Targeting the bulls-eye between aphid and caterpillar signature defense responses. **Jerry Mozoruk**, Laura Hunnicutt, Michael Bausher, Ronald Cave, and Wayne Hunter. USDA ARS USHRL 2001 S. Rock Road, Fort Pierce, FL 34945

Using nylon filter microarrays, we analyzed the expression profile of 1731 unique genes from the vascular transcriptome of *Citrus sinensis* L. Osbeck challenged by herbivory from the glassy-winged sharpshooter (GWSS), *Homalodisca coagulata* (Say). Transcripts encoding proteins functioning in direct defense, defense signaling, ROS scavenging and abiotic stress as well as proteins with unknown function were increased. Interestingly, several of the GWSS-responsive transcripts lack a significant match to any publicly deposited protein sequence signifying their potential as novel genes involved in plant defense, wound response or abiotic stress. Contrary to studies involving sap-feeding insects, we observed weak induction of SA-regulated genes. Instead, transcript profiles suggested similarities to wounding through JA-independent pathways, perhaps driven by endogenous ethylene and a close association with dehydration stress.

DSP 16. Influence of juvenile hormones and protein on male Caribbean fruit fly (Diptera: Tephritidae) sexual success. **Rui Pereira**, John Sivinski, and Peter Teal. Center for Medical, Agricultural and Veterinary Entomology P.O.Box 14565, Gainesville, FL 32604, USA

Juvenile hormone levels and adult diet have important effects on the attractiveness and competitiveness of the male Caribbean fruit fly (CFF). Laboratory and field cage experiments were conducted to compare male CFF sexual performance when submitted to four different hormone and diet combinations. In both types of experiments, male competitiveness was due clearly improvement of hormone application, protein supply, and interaction of hormone and protein.

DSP 17. The importance of color pattern in the speciation of *Heliconius heurippa* (Lepidoptera: Nymphalidae). **Christian Salcedo**. McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, S.W. 34th Street and Hull Road, P.O. Box 112710, Gainesville, Fl 32611-8525

Heliconius heurippa represents a possible case of speciation associated to introgressive hybridization. This particular species presents a wing color pattern that combines genetic elements from its possible parental species: *H. melpomene* and *H. cydno*. Butterfly models were used in approach and courtship experiments to test if sexual selection associated to wing color pattern has influenced the speciation of *H. heurippa.* The results conclude that mate choice associated to wing color pattern is not only important to the precigotic reproductive isolation but also possibly played a keyrole in the origin of *H. heurippa* through hybridization between *H. melpomene* and *H. cydno*.

DSP 18. Inherited sterility a potential tool for risk assessment of biological control agents: Effects of radiation treatment on *Cactoblastis cactorum* oviposition preference. **Colothdian D. Tate** and James E. Carpenter. USDA-ARS, CPMRU, P.O. Box 748, 2747 Davis Rd., Tifton, GA 31793-0748

Radiation induced-inherited sterility is possible in *Cactoblastis cactorum* (Berg) and full sterility occurs in the F_1 generation when irradiated males mate with non-irradiated females. Release of these females in the field could provide a unique opportunity to evaluate *C. cactorum* host range, preference, and suitability without risk of establishing a breeding population. We evaluated oviposition preference of female *C. cactorum* mated with irradiated and non-irradiated males in caged greenhouse studies, using whole plants and cladodes.

DSP 19. An extracellular Cu Zn superoxide dismutase from *Lysiphlebus testaceipes*. **Allen Weathersbee** and Laura Boykin. USDA, ARS, USHRL, 2001 South Rock Road, Fort Pierce, FL 34945

A cDNA encoding extracellular Cu Zn superoxide dismutase (SOD) was cloned from the parasitoid *Lysiphlebus testaceipes*. The protein precursor is 172 aa long and contains a 16 aa extracellular signal cleavage sequence at the amino terminal. SODs are antioxidant enzymes, and for parasites such as *L. testaceipes*, may provide additional protection against oxygen-mediated, host defenses. We provide a homology model of *L. testaceipes* SOD and discuss structural conservation among members of this ancient gene family.

DSP 20. Evaluation of traps performance for the detection of the Banana Root Borer *Cosmopolites sordidus* on plantain crops. **R. A. Franqui**, José A. Chavarría-Carvajal, and Carlos Flores-Ortega. Department of Horticulture, University of Puerto Rico-Mayagüez Campus

Adult populations of the Banana Root Borer *Cosmopolites sordidus*, were surveyed in plantains during an 18 months period using two trap systems; (1) pseudostem traps (control) and (2) a commercial trap + Cosmolure®. In addition, the relationship between adults capture and larval densities in plantain corms was examined. The most effective trap system was the commercial trap + Cosmolure®; the sex ratio was not significantly different from 1:1.

DSP 21. The first observed association between nematodes and carpenter bees. **Natsumi Kanzaki**. Fort Lauderdale Research and Education Center, University of Florida/IFAS, Ft. Lauderdale, FL

The adults of the large Japanese carpenter bee, *Xylocopa appendiculata circumvolans* were caught at Kyoto, Japan, and were dissected to examine for nematode infection. Forty-six percent of the bee harbored third stage dauer juveniles of unidentified *Aphelenchoides* sp. This nematode may be an undescribed species because of the isolation afforded by its unique association with a carpenter bee in wood. However, further morphological and molecular studies are needed to describe this species.

DSP 22. *Diachasmimorpha longicaudata* entomopoxvirus (DlEPV) DNA is present in eggs of the parasitic wasp *D. longicaudata*. **L.F. Matos** and P.O. Lawrence. University of Florida/ Entomology and Nematology Dept., Gainesville, Fl 32611-0620

Diachasmimorpha longicaudata (Dl) (Braconidae) introduces a poxvirus into *Anastrepha suspensa* (Tephritidae) larvae during oviposition. The *Dl* entomopoxvirus (DlEPV) abrogates the larva's immune system, insuring egg survival. DlEPV virions abound in the poison gland of the female wasp but it is unknown how wasp larvae acquire the virus. Using DNA dot-blots and PCR we found DlEPV DNA within DNA from wasp eggs. These data suggest that part or all of the DlEPV genome is transmitted vertically.

1. Advances in management methods for lobate lac scale, *Paratachardina lobata.* **Forrest W. (Bill) Howard**. University of Florida/IFAS, Ft. Lauderdale Research & Education Center, Davie, FL.

2. *Metamasius callizona*, an immigrant bromeliad-eating weevil, and Florida's native bromeliads. **Teresa Cooper**. University of Florida/IFAS, Entomology & Nematology Department, Gainesville, FL.

3. *Cactoblastis cactorum* (Lepidoptera: Pyralidae): An update on the biology, current distribution and prospects for management of the cactus moth. **James P. Cuda**, Stephanie Bloem, James E. Carpenter, and Stephen D. Hight. University of Florida/IFAS, Entomology & Nematology Department, Gainesville, FL

4. Updates on pink hibiscus mealybug and sweet potato whitefly, biotype 'Q'. **Lance Osborne**. University of Florida/IFAS, Mid-Florida Research & Education Center, Apopka, FL.

5. Invasive termite pest species in Florida. **Nan-Yao Su**. University of Florida/IFAS, Ft. Lauderdale Research & Education Center, Davie, FL.

6. Meet the white-footed ant. **John Warner**. University of Florida/IFAS, Ft. Lauderdale Research & Education Center, Davie, FL.

7. Current efforts to exclude invasive pests at the port of entry. **Fernando Lenis**. USDA APHIS PPQ, Miami Inspection Station Miami, FL.

The introduction of invasive pests represents a significant threat to the health of animals, plants and ecosystems of the US. To prevent such introduction, Plant Protection and Quarantine (PPQ) performs many exclusion activities at ports of entry. Creation of the Department of Homeland Security (DHS) in 2003, resulted in the transfer of many inspection activities and personnel to DHS' Customs and Border Protection (CBP). Today, PPQ and CBP employ inspections to detect pests, deter potential threats, and protect agricultural production and infrastructure from terrorism. PPQ retained responsibility for exclusion activities (AQI) in the areas of policy development, pest identification, preclearance operations, training, export certification, inspection of propagative material, enforcement of CITES regulations, budget, and quality assurance of effectiveness of all Federal AQI inspections and related activities.

Regarding Florida, in fiscal year 2004, the port of Miami processed about 83% of all cut flowers, 73% of all propagative material, and 53% of all fruits and vegetables entering through US airports. The Port of Miami (POM) is home to the largest container seaport in Florida and it's among the top 10 in the US. Exclusion activities include but are not limited to the inspection of commodities, means of conveyance (maritime vessels, rail, vehicles and aircraft), mail, courier bags, and passenger baggage. Quarantine Significant Pest Interceptions (QSPIs) totaling 7,409 were produced by cargo, cargo aircraft and mail inspections at Miami International Airport (MIA). The Miami Maritime Operations Unit reported 1,488 QSPIs. In addition, inspections of propagative material at the Miami Inspection Station (MIS) and of commercial aircraft and passenger baggage at MIA yielded 2,715 and 4,463 QSPIs respectively.

8. Cooperative Agricultural Pest Survey (CAPS). **Adam Silagyi**. Division of Plant Industry, Florida Department of Agriculture and Consumer Services.

9. Group decision process involved in developing responses to new invasive pest threats. **Brian Spears**. USDA APHIS PPQ CPHST Raleigh, NC.

The New Pest Advisory Group (NPAG) is in the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine Center for Plant Health Science & Technology, Plant Epidemiology and Risk Analysis Laboratory (USDA-APHIS-PPQ-CPHST-PERAL). The NPAG mission is to assess new and imminent plant pest introductions and quickly recommend options or the course of action that PPQ should take regarding the pest. When someone notifies the NPAG of such a pest, the NPAG confirms the report, assembles an *ad hoc* panel, coordinates information sharing, solicits expertise, and evaluates the significance of plant pests believed to be new to, or imminently threatening the U.S. The NPAG makes recommendations to the APHIS-PPQ Executive Team (ET), but does not make policy. The ET dictates policy. Expertise can come from a variety of sources such as PPQ National Identification Services (NIS), Agricultural Research Service Systematic Entomology Laboratory, Web Page Alerts, Pest Societies, PPQ Regional Staff, PPQ State Plant Health Directors, State Agriculture Departments, US Forest Service, Universities, Foreign Governments, Industry, etc. The NPAG Process involves an initial analysis to determine if the pest is an NPAG issue, and if so, if it is a major or minor pest. Some possible NPAG Recommendations to the PPQ-ET are: take no action against the pest, conduct program(s) such as survey or methods development in order to gather information, conduct actions such as eradication, quarantine, population management or public education, or refer action to other institutions such as States, other Federal agencies or industry groups. The NPAG analyses numerous plant pests each year. For example, in fiscal year 2004 the NPAG considered 119 pests. They pre-assessed and dropped 39 pests from further consideration, leaving 80 open pest cases. Fifty-six of the 80 pest files were completed and closed. Of the 56 pests for which cases were completed, 33 are new to the continental United States, 6 are established or re-introduced and 18 are "imminent threats" meaning that there is a present and open pathway for the pest to follow to the United States. The NPAG reports contain information describing the current PPQ Policy, an overview of the pest situation, the current response and activities, and the NPAG recommended PPQ Policy.

10. Industries perspective and involvement with invasive pest problems. **Jim Spratt**. Florida Nursery, Growers and Landscape Association, Orlando, FL.

11. Dispersal behavior of flower-thrips in Highbush and Rabbiteye blueberry fields. **Héctor Alejandro Arévalo** and Oscar

Liburd. Department of Entomology & Nematology, University of Florida, Gainesville, FL

The dispersal behavior of flower-thrips, a key pest in Florida blueberries, is unknown. To understand it, we observed thirips behavior during two consecutive flowering seasons. We found that flower-thrips first appear in clusters, which rapidly increase in area and population until they cover the entire area. Thrips populations peak when near 90% of the flowers are opened in the field, then they rapidly decline after petal fall. We were able to describe their behavior with a logistic model.

12. Effects of quantity and quality of competing light sources on catch efficacy of UV light traps. **Matthew D. Aubuchon**. Department of Entomology & Nematology, Building 970 Natural Area Drive / Gainesville, FL 32611

House flies were exposed to 4 intensity levels of competing fluorescent light and their response to a UV light trap was measured. Flies were also exposed to 4 different sources (qualities) of competing light and their response to a UV light trap was also measured. All treatments were compared to concurrent dark controls with no competing light sources. Results indicate that as intensity of competing light sources increases, the catch efficacy of insect light traps decreases.

13. Termite digestive enzymes. **Joseph A. Smith**. Department of Entomology & Nematology, University of Florida

Several cellulase and hemicellulase activities were investigated across different regions of the digestive system of *Reticulitermes flavipes* workers. Endoglucanase, exoglucanase, beta-glucosidase, xylanase, beta-xylosidase and beta-mannosidase activities were assayed. Gut regions assayed consisted of the combined foregut & salivary glands, the midgut and the hindgut. A proposed system of polysaccharide degradation was derived from the data obtained.

14. Mechanisms of resistance in St. Augustine grass lines to southern chinch bug, *Blissus insularis* Barber (Hemiptera: Lygaeidae). **M. Rangasamy**, H. J. McAuslane, R. H. Cherry, and R.T. Nagata. Dept. Of Entomology and Nematology, University of Florida, Gainesville FL 32608

Blissus insularis Barber is the most important insect pest of St. Augustinegrass in Florida. Choice tests measuring preference and no-choice tests measuring feeding, oviposition and development were conducted to determine the mechanisms of chinch bug resistance in two lines of St. Augustinegrass, 'FX-10' and NUF-76. In choice tests, adults spent less time on resistant lines and in no-choice tests produced fewer eggs and nymphs on resistant lines than on susceptible lines.

15. An essential cue used by *Triaspis eugenii* Wharton and Lopez-Martinez (Hymenoptera: Braconidae) to locate host eggs of pepper weevil, *Anthonomus eugenii* Cano (Coleoptera: Curculionidae). **Esteban Rodriguez**, Philip A. Stansly, and David J. Schuster. University of Florida, Southwest Florida Research and Education Center, Immokalee, FL 34142.

Triaspis eugenii Wharton and Lopez-Martinez (Hymenoptera: Braconidae) is a solitary egg-prepupa parasitoid of pepper weevil, a key pest of pepper in much of the New World. Given the evident potential for augmentative biological control due to high incidence in its native Mexico, it was important to better understand how *T. eugenii* finds its host. Preliminary observations suggested that, after alighting on the fruit, the oviposition plug left by the pepper weevil female leads the wasp to the host egg. Choice and non-choice tests showed that *T. eugenii* females parasitized almost exclusively eggs covered with the oviposition plug ($p=0.001$) in preference to eggs with the plug removed.

16. Susceptibility of selected Rabbiteye blueberry varieties to cranberry tipworm (Diptera: Cecidomyiidae) attack and effectiveness of reduced-risk insecticides for control. **Craig Roubos** and Oscar Liburd. University of Florida Entomology and Nematology, Building 970 Natural Area Dr., PO Box 110620, Gainesville, FL 32611-0620

Cranberry tipworm (CTW), *Dasineura oxycoccana* (Johnson), is a key pest of rabbiteye blueberries (*Vaccinium ashei* Reade) in southeastern United States. Larvae feed on young meristematic tissues and developing buds. In an attempt to develop an integrated approach for control of CTW, I studied four commonly used rabbiteye varieties for susceptibility, and screened reduced-risk and conventional insecticides. Premire appears to be a more susceptible variety, and several reduced-risk insecticides show potential for controlling CTW.

17. Survival and development of neonate lepidopterous pests on resistant Romaine lettuce. **A. Sethi**, H. J. McAuslane, R. T. Nagata, and G. S. Nuessly. Dept. of Entomology & Nematology, University of Florida, Gainesville, FL

Larval mortality of beet armyworm (BAW), *Spodoptera exigua* and cabbage looper (CL), *Trichoplusia ni* was significantly higher on resistant 'Valmaine' than on susceptible 'Tall Guzmaine'. Average weight per larva after 8 days on 'Tall Guzmaine' was eight times (BAW) and two times (CL) that of larvae on 'Valmaine'. Larval growth on 'Valmaine' was significantly reduced compared to that on 'Tall Guzmaine'. CL may have performed better than BAW on 'Valmaine' because of its feeding behavior.

18. Identifying host-strain behavioral differences of fall armyworm in Florida (Lepidoptera: Noctuidae). **Charles J. Stuhl**, Robert L. Meagher, Jr., and Rodney N. Nagoshi. University of Florida/USDA-ARS

Florida is a known overwintering site for fall armyworm (FAW), *Spodoptera frugiperda* (J. E. Smith). Previous research suggests that this insect comprises two genetically different host-strains. Female ovipositional site selection between corn and stargrass plants were behavioral traits measured. Rice-strain females exhibited a strong ovipositional

preference (95%) for stargrass plants. Corn-strain moths oviposited 53% of egg masses on the test enclosure, rather than on host-plants. Stargrass (30%) and corn plants (17%) also contained egg masses.

19. A comparison of the effects of organophosphate insecticide exposure and temperature stress on *Wolbachia* infection and life history traits in *Aedes albopictus*. **Supat Wiwatanaratanabutr** and Pattamaporn Kittayapong. Center of Excellence for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University, RamaVI Road, Bangkok, 10400 Thailand

Wolbachia bacteria are currently being investigated for spreading disease-blocking transgenes through populations of the dengue vector, *Ae. albopictus*, via a reproductive effect called cytoplasmic incompatibility. It is important to know environmental effects on *Wolbachia*-infected and uninfected mosquitoes. The effects of different temperatures (25 C, 37 C) and insecticide exposure during larval development were examined in *Wolbachia*-infected and uninfected strains of *Ae. albopictus*. A high concentration of temephos was associated with a reduction in survival rate and wing size but not in development time in both host strains.

20. Termite consumption of building materials causes thermal damage to building materials. **Cynthia Tucker** and Philip Koehler. University of Florida, Building 970 Natural Area Drive, Gainesville, Florida 32611

Eastern subterranean termites cause millions of dollars of damage per year. Termites usually enter houses form an underground tunnel network and begin to tunnel onto the building components. This study looked at the effect of termite consumption no structural and nonstructural components of building products. Evaluating the thermal profile of the building materials with an Infra-red camera. In general when measuring unit area of a building product in calories of heat through time a heat quotient can be determined. This heat quotient rises at a faster rate through time when the building material is damaged by termites.

21. A novel approach for testing efficacy of new pesticide formulations for control of house flies. **Ricky Vazquez** and Phil Koehler. University of Florida, Dept. Entomology & Nematology, Natural Area Drive, Gainesville, FL 32611

We evaluated new neonicotinoids, pyrazoles, and permithrin based products for house fly control. The selected pesticides were applied to strips of chromatograph paper that would serve as contact surfaces. We tested the speed of toxicity at 2, 24, and 48 hours in petri dish bioassays along with 24 and 48 hour readings in caged bioassays. Our laboratory results indicate that an attractant added to the formulations increases toxicity depending on which chemical class product used.

22. Development of trapping methods for the pink hibiscus mealybug *Maconellicoccus hirsutus* (Green) (Homoptera: Pseudococcidae). **Antonio Francis**. Florida A&M University, 1434 Melvin Street, Apt. 2 Tallahassee, FL. 32301

The pink hibiscus mealybug, *Maconellicoccus hirsutus* (Green) is a serious new invasive pest to the USA, and monitoring its spread is imperative. Using a recently developed synthetic sex pheromone, three trap types were compared relative to their efficiency at capturing male mealybugs. The length of time that lures formulated with the pheromone remained attractive to males was also examined. Delta IIID traps proved to be most effective, with the lures lasting greater than 6 months.

23. Efficacy of borates in ethylene glycol against the eastern subterranean termite. **Colin D Hickey**. Department of Entomology and Nematology, University of Florida, Building 970 Natural Area Drive, Gainesville, Florida 32611

Disodium octaborate tetrahydrate in solution with ethylene glycol was applied to filter papers to determine feeding deterrence and mortality of Reticulitermes flavipes over 8 days. The paper was treated at the label application rate. Feeding preference was determined before mortality occurred (<4 days). Borate treated filter paper was a feeding deterrent as 5.55 mg were consumed as opposed to the water treated paper where 36.45 mg were consumed in the same time period. Eight-day mortality was 89% for termites in the borate treated containers.

24. Developing IPM techniques for sap beetle pests of strawberries. **Crystal A. Kelts**, Oscar E. Liburd, and Baldwyn Torto. Entomology and Nematology Department. University of Florida. PO Box 110620, Gainesville, FL 32611-0620

Sap beetles (Coleoptera: Nitidulidae) cause significant damage to Florida strawberry crops. Experiments were conducted to better understand sap beetle behavioral response to potential host and non-host baits as well as response to different stages of strawberry fruit. Insecticide bioassays were also conducted in order to determine the efficacy of conventional and reduced risk insecticides against sap beetle pests. Results showed promising bait treatments and potential to integrate reduced risk insecticides in a strawberry IPM system.

25. Laboratory evaluation of perimeter treatments for control of the pharaoh ant, *Monomorium pharaonis* (L.). **David Melius**. University of Florida Entomology Dept. University of Florida. PO Box 110620, Gainesville, FL 32611-0620

Non-repellent residual insecticides have become extremely popular for treating ant infestations. The toxicant is allegedly transferred throughout the population to achieve colony control. A laboratory study was conducted to observe the effects of a perimeter treatment on a colony of the pharaoh ant, *Monomorium pharaonis* (L.). Bridges treated with water, termidor (fipronil) and demand CS (Lambda-Cyhalothrin) were placed in trays containing small colonies. Worker and queen mortality were recorded for 4 weeks.

26. Cockroach bait aversion. **Linda NcHerne**. Department of Entomology & Nematology, University of Florida
German cockroaches (*Blattela germanica*) have developed a behavioral form of insecticide resistance wherein they refuse to eat gel bait formulations. Six commercial bait formulations and dog food were provided to susceptible Orlando strain and bait-aversive Daytona strain German cockroaches. Bait and food consumption was calculated and four day mortality recorded to quantify bait aversion.

27. The effect of different attractants and arrestants on the efficacy of fly trap ability to catch the house fly, *Musca domestica* L. **Ryan Welch** and P. Koehler. Building 970 Natural Area Dr. Gainesville, FL 32611
Fly traps can be used to monitor fly populations or as fly management tools that are safe, inexpensive alternatives to pesticides. Commercial traps rely on an attractant mixture to cause flies to enter and a funnel-type system in order to retain them. New attractants and arrestants were evaluated to determine the effects on trapping efficacy on the house fly, Musca domestica L.

28. Prospects for biological control of strawberry guava, *Psidium cattleianum* Sabine, in Florida. **Frank J. Wessels** and James P. Cuda. University of Florida, Entomology and Nematology Dept., Gainesville, Florida
Strawberry guava (SG) is an invasive weed native to southeastern Brazil. Introduced to Florida as an ornamental, SG escaped cultivation and alters native plant communities. Furthermore, SG is a preferred host of the caribfly, *Anastrepha suspensa* Loew, an agricultural pest in Florida. A leaf-galling eriococcid, *Tectococcus ovatus* Hempel has been imported into quarantine for host range testing. Preliminary results suggests *T. ovatus* is highly host specific and may prove safe to release in Florida.

29. Controlling twospotted spider mite (*Tetranychus urticae* Koch) in Florida with single and combination treatments of *Phytoseiulus persimlis*, *Neoseiulus californicus*, and Acramite. **Elena M. Rhodes** and Oscar E. Liburd. Entomology and Nematology Department. University of Florida, PO Box 110620, Gainesville, FL 32611-0620
Laboratory and field experiments were conducted during from 2003 to 2005 to determine the effectiveness of single and combination treatments of *Phytoseiulus persimlis* Athias-Henriot, *Neoseiulus californicus* McGregor, and Acramite for control of twospotted spider mite (TSSM) (*Tetraenuchus urticae* Koch) in Florida strawberry fields. Combination treatments significantly reduced TSSM populations below levels in the control. Populations of TSSM in the Acramite treatment remained higher in 2005, possibly due to late application.

30. CPVC & termiticides. **Justin S. Saunders**. Department of Entomology & Nematology, University of Florida
Residual soil termiticides are directly applied to soil surrounding CPVC water supply lines. Solvents in these termiticides have been reported to degrade water supply lines. This leads to concerns of pipe failure by solvents in termiticide formulations. CPVC water supply lines are also exposed to some amount of the CPVC glue, which also has a high concentration of solvents. The objective of the study was to see if there is a relationship between the amount of glue exposure and time to failure of the CPVC pipe.

31. The complete nucleotide sequence and gene organization of the mitochondrial genome of the Korean hairstreak, *Coreana raphaelis* (Lepidoptera: Lycaenidae). **Iksoo Kim**, Eun-Mee Lee, Kwang-Youl Seol, Eun-Young Yun, Jae-Sam Hwang, and Byng Rae Jin. Department of Agricultural Biology, The National Institute of Agricultural Science and Technology, Suwon 441-100, Korea
The complete nucleotide sequences of the mitochondrial genome (mitogenome) of the *Coreana raphaelis* (Lepidoptera: Lycaenidae) was determined. The 15,314 bp long *C. raphaelis* mitogenome contains lepidopteran-specific gene order and arrangement, but has an extra $tRNA^{Ser}$(AGN), which encodes an anticodon ACT, instead of the common TCT. The *C. raphaelis* is the first species of the lepidopteran insect with 23 tRNA genes instead of the usual 22. The aniticodons of all lepidopteran tRNAs sequenced in their entire mitogenomes (including two nearly completed ones) are universally identical to their counterparts, except for *C. raphaelis* $tRNA^{Ser}$(AGN), for which TCT, instead of GCT, was utilized. The $tRNA^{Ser}$(AGN) could not form a stable stem-and-loop structure in the DHU arm as shown in many other insect $tRNA^{Ser}$(AGN). Genes overlap in a total of 20 bp in 4 locations and contain a total of 178 bp of intergenic spaces spread over in 17 locations. The *C. raphaelis* A+T-rich region contains several short conserved sequence blocks (6 bp ~ 13 bp) scattered through the whole region, a poly-thymidine stretch, TA(A)n-like stretch downstream of the poly(T) stretch, and several inverted sequence blocks that have the potential to form stable stem-and-loop structure without conserved flanking sequences at each end. The initiation codon for *C. raphaelis* COI gene appears to be the tetranucleotide, TTAG, found commonly in the sequenced Lepidoptera. Only five of 13 protein-coding genes (PCGs) have a complete termination codon, and the remaining eight have incomplete T or TA. The PCGs neighboring to the 5' end region of another PCG (ATPase8, ATPase6, ND4L, and ND6) have a potential to form hairpin structure. The complete nucleotide sequence of the *C. raphaelis* mtDNA described here will be useful sequence information to determine genetic relatedness of donor and donee populations of the rare *C. raphaelis*.

32. Mitochondrial and microsatellite data for *Anastrepha suspensa* (Caribbean fruit fly): Implications for Caribbean

biogeography. **Laura M. Boykin**, Robert G. Shatters, Jr., David G. Hall, Ken Hibbard, and Ann Fritz. Subtropical Insects Research Unit, USDA-ARS-USHRL, 2001 South Rock Road, Ft. Pierce, Florida 34945

The recent increase in observance of citrus infested with A. suspensa in Florida has raised questions regarding host-specificity of certain populations and genetic diversity throughout its geographic distribution. Phylogenetic analyses of the mitochondrial COI gene from A. suspense collected at different geographical locations throughout Florida and the Caribbean show similar sequence diversity within and among all populations. However, using eight microsatellite loci, preliminary data show allelicdiversity within and between populations from the current distribution.

33. Sensitivity of acetylcholinesterase in a field strain of the fall armyworm, *Spodoptera frugiperda* (J.E. Smith). **S. J. Yu**. Department of Entomology & Nematology, University of Florida, Gainesville, FL 32611

Acetylcholinesterase (AChE) was purified from the heads of the fall armyworm (*Spodoptera frugiperda*) by using a two-step procedure involving gel filtration on a Sephadex G-200 column and affinity chromatography on a procainamide-ECH Sephadex 4B column. The purified AChE from the field strain was 17- to 346-fold less sensitive than that from the susceptible strain to inhibition by carbamates (carbaryl, methomyl, bediocarb) and organophosphates (methyl paraoxon, paraoxon), insensitivity being highest toward carbaryl.

34. A JcDNV-derived somatic transformation vector for insects and the role of viral enhancer sequences. **Paul Shirk**. USDA-ARS Center for Medical, Agricultural, and Veterinary Entomology, Gainesville, FL

Stable somatic transformation of insects following microinjection of syncytial embryos or by transfection of cells can be achieved by integration of entire plasmids containing the *Junonia coenia* lepidopteran densovirus (*Jc*DNV) genome. Effects of sequence modifications including addition of expression cassettes on *Jc*DNV transformation activities in Lepidoptera and Diptera were assessed. These modifications demonstrate that the somatic transformation activity is dependent upon sequences of the 5' ITR and influenced by sequences internal to the densovirus genome.

35. Utilization of an EST library created from the red imported fire ant, *Solenopsis invicta*, for discovery of new microbial control pathogens. **Steve Valles**. USDA-ARS Center for Medical, Agricultural, and Veterinary Entomology, Gainesville, FL

An expressed sequence tag (EST) library was generated from a monogyne colony of the imported fire ant, *Solenopsis invicta*. Several ESTs exhibited significant homology to sequences from positive-strand RNA viruses of the Picornaviridae. Reverse-transcription polymerase chain reaction (RT-PCR) confirmed the presence of an RNA virus among field-collected fire ants in Florida. The virus was named *Solenopsis invicta* virus-1 (SINV-1) and represents the first viral infection reported in the *Solenopsis* genus. The genome was subsequently sequenced in entirety and yielded an 8,026 nucleotide, polyadenylated, RNA genome encoding two large open reading frames (ORF1 and ORF2). The predicted amino acid sequence of the 5' proximal ORF1 exhibited significant identity and possessed consensus sequences characteristic of the helicase, cysteine protease, and RNA-dependent RNA polymerase sequence motifs from picornaviruses. The predicted amino acid sequence of the 3' proximal ORF2 showed similarity to structural proteins in picorna-like viruses, especially the acute bee paralysis virus. Electron microscopic examination of negatively stained samples from virus-infected fire ants revealed isometric particles with a diameter of 31 nm, consistent with Picornaviridae. A survey for the fire ant virus from areas around Florida revealed a pattern of fairly widespread distribution. Among 168 nests surveyed, 22.9% were infected. Additional genotypes of SINV-1 have been subsequently identified.

36. Gene discovery and transcript profiling during fruit development and leaf damage in grapefruit. **Xiomara Sinisterra-Hunter**. University of Florida, and USDA-ARS, Fort Pierce, FL

An expressed sequence tag (EST) library was generated from a monogyne colony of the imported fire ant, *Solenopsis invicta*. Several ESTs exhibited significant homology to sequences from positive-strand RNA viruses of the Picornaviridae. Reverse-transcription polymerase chain reaction (RT-PCR) confirmed the presence of an RNA virus among field-collected fire ants in Florida. The virus was named *Solenopsis invicta* virus-1 (SINV-1) and represents the first viral infection reported in the *Solenopsis* genus. The genome was subsequently sequenced in entirety and yielded an 8,026 nucleotide, polyadenylated, RNA genome. Electron microscopic examination of negatively stained samples from virus-infected fire ants revealed isometric particles with a diameter of 31 nm, consistent with Picornaviridae.

37. Long Oligo Microarray Applications in Entomology and Related Disciplines. **Phillip M. Douglass**. Agilent Technologies, Germantown, MD

The development of customizable DNA microarrays has enabled researchers to perform gene expression studies and to obtain corresponding data as never before imagined. Advances in printing and manufacturing technologies have provided a highly flexible yet reproducible set of tools for gene expression experiments. Such flexibility has opened up microarray technologies to scientists studying countless different organisms. This talk will focus on the Agilent microarray platform. Specifically, a detailed overview will be presented on how the in-situ, ink-jet-manufactured 60-mer oligo technology enables flexibility and sensitivity for creating custom arrays tailored to individual scientist needs. Outlining the Agilent gene expression workflow from probe design through data analysis, specific data presented will highlight recent custom microarray work published on sex-specific nonadditivity of gene expression in *Drosophila*

melanogaster. Additional applications and data will be introduced from Agilent's commercial *Caenorhabditis elegans* microarray.

38. Survey on the termite associate nematodes in south Florida. **Natsumi Kanzaki**, Rudolf H. Scheffrahn, Robin M. Giblin-Davis. Fort Lauderdale Research and Education Center, University of Florida/IFAS

To elucidate nematode-termite associations, common termite species in South Florida were surveyed for nematode associates. Most isolated nematodes were either dauer or parasitic juveniles of rhabditid species. A few diplogasterid dauer juveniles were observed. At present, we have established four rhabditid nematode cultures. Morphological and molecular identification and description of these cultured-species and intensive survey for isolation of the other nematode species are necessary to elucidate the diversity and natural history of these nematode-termite associates.

39. Performance of Recruit(r) IV against North American Subterranean Termites (Isoptera: Rhinotermitidae) When Evaluated in a Quarterly Monitoring Program**. J. E. Eger**, T. H. Atkinson, L.-C. Lee, M. T. Messenger, P. A. Neese, E. M. Thoms, and M. P. Tolley. Dow AgroSciences, 2606 S. Dundee Blvd., Tampa, FL 33629

Studies were initiated in 2004 to characterize the performance of Recruit(r) IV in a quarterly monitoring/bait replenishment schedule. Colonies around structures or in grids were characterized by dye and DNA studies prior to baiting with Recruit IV. Active stations were monitored monthly to assess termite activity over time. However, all changes to the system such as replacement of monitoring devices, installation of bait, etc., were only done at three month intervals to simulate a quarterly monitoring/replenishment schedule. Based on consumption and time to elimination data, quarterly replenishment schedule for monitoring devices and bait tubes resulted in excellent control of colonies baited.

40. Super-Sizing" Fumigation: Fumigation of a University Chemistry Research Building with Vikane gas fumigant. **Ellen Thoms** and Roger Mensing. Dow AgroSciences, Gainesville, FL) and

Leigh Hall on the University of Florida campus in Gainesville, Florida, is used for teaching and research by the Chemistry Department. Leigh Hall, listed on the National Register of Historic Places, was built in 1927 with a new wing added in 1947. Leigh Hall had chronic infestation of drywood termites for many years. Repeated treatments, including compartmentalized fumigations and localized insecticide treatments, were unsuccessful in controlling the infestation. It was determined in 1994 that Leigh Hall required whole structure fumigation to eliminate the drywood termite infestation. Leigh Hall was challenging to fumigate due its large size (1.4 million ft^3 and four-stories in height), steep roof (1:1 pitch); proximity to other features on campus (trees, roads, and connected to the Chemistry Research Building) which prevented use of a crane, and unique contents (specialized analytical equipment and diversity of chemicals). Despite these issues, the building was successfully fumigated by Pestguard Fumigating in November 2004 using Vikane gas fumigant. The presentation reviews the strategies Pestguard used to overcome the obstacles to fumigation, such as use of three 120' lifts, custom-made tarps, and creative sealing methods. The fumigation was successfully completed after a 33 hour fumigation period, with an average fumigant half loss time of 17 hr. A 199 oz-hr dosage was accumulated: 105 oz-hr was needed to control drywood termites based on the coldest temperature measured. There was no reported damage to laboratory equipment or chemicals. Minor damage to some roof tiles and landscape features was less than anticipated. No live drywood termites have been reported in Leigh Hall following the fumigation.

41. Off With Their Heads! The Establishment of the Decapitating Phorid Fly. **Adrian Hunsberger** and Ruben Regalado. UF/Miami-Dade County Extension, Homestead, FL

The imported fire ant (*Solenopsis invicta*) has become a serious pest of the southern U.S. One strategy is to use biocontrol agents to reduce fire ant populations. March 2003, we released decapitating phorid flies (*Pseudacteon tricuspis*) in Miami. The results of this release will be discussed.

42. Does *Melaleuca quinquenervia* chemotype matter to the *Fergusobia quinquenerviae/Fergusonina turneri* complex? **R. M. Giblin-Davis**, Weimin Ye, K. A. Davies, S. J. Scheffer, G. S. Taylor, M. F. Purcell, G. Wheeler, P. Pratt, T. D. Center, and W. K. Thomas. University of Florida, 3205 College Avenue, Fort Lauderdale, FL 33314

Melaleuca quinquenervia was sampled from Sydney, New South Wales to Cairns, Queensland in Australia for galls induced by the *Fergusonina turneri/Fergusobia quinquenerviae* complex and chemotyped for the sesquiterpene chemotype (Viridiflorol vs Nerolidol) of the tree using GC-MS analysis. Galls were dissected, or set-up in rearing bags for fly emergence for nematode and fly mtCOI DNA sequence analysis. Flies and nematodes were recovered from galls from both chemotypes. No consistent genotypic patterns that correlated with host chemotype were observed.

43. Food quality and reproductive fitness of the predator *Podisus maculiventris*. **Jeffrey P. Shapiro**, Jesusa C. Legaspi. USDA, ARS, CMAVE, 1600 SW 23rd Drive, Gainesville, Florida 32608

To determine the nutritional value of prey to adult female *Podisus maculiventris* in terms of biochemical effects, and to further define food quality, fresh weights and contents of lipid, total soluble protein, and yolk protein were compared

over periods of 7, 15, and 22 days in response to feeding on each of five prey species. Total lipid content was the most significant parameter in relation to time, species of prey, and reproduction in the predator.

44. Prospects for biocontrol of the Glassy-winged sharpshooter, *Homalodisca coagulata* (Say). **Christopher Tipping** and Russ Mizell III. University of Florida NFREC, 155 Research Rd, Quincy, FL 32351

Within the native range of the Glassy-winged sharpshooter several natural enemies have the potential to control introduced infestations in California, Hawaii, and Tahiti. Several species of egg parasitoids (Mymaridae) are presently utilized as part of a classical biocontrol program in California. Newly discovered mycopathogens as well as a strepsipteran that attacks a related leafhopper species are currently under investigation.

45. Effectiveness of two Predatory Mites in Controlling the Twospotted Spider Mite, *Tetranychus urticae* (Acari: Tetranychidae) in West Central Florida. **S.I. Rondon**, J.F. Price, C. Nagle, and D.J. Cantliffe. Univ. of Florida, Horticultural Science Dept.

The twospotted spider mite (*Tetranychus urticae* Koch) is the most detrimental arthropod pest in strawberry (*Fragaria ananassa* Duchesne) in Florida. Chemical tactics are available to control this pest but they must be repeated throughout the season and related field re-entry and harvest intervals interfere with field operations and harvest. Non-chemical control strategies rely on the use of certified plants, resistant varieties, and the use of predatory mites. Biological control provides a practical complement option to pesticides. The objective of our research was to study the effectiveness of two species or predatory mites, *Phytoseiulus persimilis* Athias-Henriot, and *Neoseiulus californicus* McGregor, in controlling the twospotted spider mite. An on-farm experiment was carried out in two growers' fields in Floral and Plant City, Florida. Predatory mites were released at a rate of one predatory mite per plant when approximately 10% of the leaflets were infested with one or more twospotted spider mites. Our data suggested that early releases of predatory mites, sometimes in combination with soft miticides, can provide season-long control.

46. Incidence of *Diaphorina citri* (Hompotera: Psyllidae) and its natural enemies in Puerto Rico. **R.W.H. Pluke**, P.A. Stansly, & A. Escribano. Southwest Florida Research and Education Center, Institute of Food and Agricultural Science, University of Florida, 2686 St. Rd. 29 N., Immokalee, FL 34142

Damaging levels of Asian citrus psyllid, *Diaphorina citri* Kuwayama on citrus have been reported in Florida but not in Puerto Rico where the psyllid was first detected in 2001. Studies to evaluate the impact of natural enemies suggest that while generalist coccinellid species can feed on the psyllid, *Tamarixia radiata* Waterston, an exotic parasitoid that appeared spontaneously on the island, has greater impact on field populations.

47. Non-Indigenous Insect Species in Puerto Rico: A Case Study. **Rosa A. Franqui**. University of Puerto Rico-Mayagüez Campus

Because of the large volume of commerce and travel taking place within and across its borders, Puerto Rico has been and continues to be especially prone to insect pest introductions. Consequently, throughout the twentieth century a great number of extremely damaging insect pests became established in Puerto Rico as the result of both accidental and intended introductions. Recent introduced non-native pests include, Asiatic citrus psillid, pink hibiscus mealybug, and the Asian pigeon pea fly.

48. The obligate parasitic beetle*, Coccotrypes rhizophorae* causes high mortality in its host plant, *Rhizophora mangle* (Red Mangrove) and may influence canopy dominance in mangrove forests in Florida. **Donna J. Devlin**. Harbor Branch Oceanographic Institute, Ft. Pierce, Florida, USA 34946

Predators that feed differentially, selecting only one or a few species can influence the species diversity and abundance patterns of assemblages. The effects of *Coccotrypes* on established seedling populations of *Rhizophora mangle* in open- and closed-canopy forests differed ($P<0.001$). *Coccotrypes* was the most important predator, responsible for high mortality of seedlings in closed- canopy forests, greatly reducing *Rhizophora* density in the understory. *Coccotrypes* reduces or eliminates competition and may allow other species to enter the canopy.

49. Entomological Website Usage Patterns. **Richard Mankin**. USDA-ARS CMAVE, 1700 SW 23rd Dr. Gainesville, FL 32608

A 5-year review of logfiles at three Florida entomological research websites indicated that usage has increased since 1999 and that visitors have taken advantage of Internet search engines to find pages with high information content. Entomological organizations may wish to consider increasing the numbers of web pages containing information about common and exotic pests that are of interest to the public.

50. Seasonal Activity of Pink Hibiscus Mealybug in East Central Florida Based on Pheromone Trapping of Males. **David G. Hall** and Stephen L. Lapointe. USDA-ARS, 2001 South Rock Road, Fort Pierce, FL 34945

A research project was established in East Central Florida to assess the seasonal activity of pink hibiscus mealybug (PHM) using sticky traps baited with a new synthetic pheromone. PHM males were relatively abundant at traps from June through November 2004 with peak activity during July 2004. Few males were collected at traps during April-May

2004 or during January-April 2005. Lures baited with the new synthetic pheromone had a residual period of activity greater than seven months.

51. Effects of Fall Armyworm Interstrain Mating in Wild Populations. **Robert L. Meagher**, Rod Nagoshi, Gregg Nuessly and David Hall. USDA-ARS-CMAVE, 1700 SW 23rd Drive, Gainesville, FL 32608

Fall armyworm is a significant agricultural pest attacking corn, grasses, sugarcane and other crops. The species is composed of two morphologically identical host strains that differ physiologically and behaviorally. We examined wild populations in southern Florida to test the possibility that interstrain mating was occurring and if these hybrids exhibited habitat preferences. Samples of larvae and adults taken from corn and sugarcane fields showed that plant host biases associated with host strains were maintained.

52. Phenological modeling for arthropods: Is Florida different than the rest of the U.S.? **Russell F. Mizell, III**. University of Florida, NFREC-Quincy

Because arthropods are poikilotherms, they cannot regulate their internal body temperature. As a result, their development is dependent on environmental temperatures. Phenology models use temperature to predict important biological events in the population dynamics of arthropods. Such models are very useful for making IPM decisions. Pest management in Florida, in contrast to other states such as California, has few phenology models available for use. The scientific details underlying this situation will be discussed.

53. BAS 320 I: Control of Key Insect Pests in Vegetables. **Larry J. Newsom**. BASF Corp., 2511 Old Ocilla Road, Tifton, GA 31794

BAS 320 I is a new semicarbazone insecticide with low risk to beneficial insects, pollinators, man, and other non-target species. Its novel mode of action makes it an ideal candidate for insect resistance management programs. Key crop segments will include potatoes, fruiting and leafy vegetables, cole crops, and cotton. BAS 320 I has excellent biological activity against *Leptinotarsa decemlineata, Pieris rapae, Trichloplusia ni, Helicoverpa* spp*., Spodoptera* spp*., Manduca sexta, Lygus lineolaris*, flea beetles and cotton flea hopper.

54. Does time of whitefly infestation affect the development of tomato irregular ripening disorder? **C. L. McKenzie** and J. P. Albano. Subtropical Insects Research Unit, United States Horticultural Research Laboratory, 2001 South Rock Road, Fort Pierce, FL 34945

Our objective was to determine if tomato irregular ripening disorder (TIR) will develop in a healthy plant that is introduced to whiteflies at different developmental stages of plant growth: 5-7 true leaf, flower, green fruit, and breaking red fruit. Time of whitefly infestation did not significantly affect the development of TIR when whiteflies were introduced at 5-7 leaf, flower or green fruit stages of plant growth (95 to 100% of the fruit developed TIR). Surprisingly, 80% of the plants infested at breaking red fruit stage also developed TIR.

55. Distribution of Chili thrips, *Scartothrips dorsalis* Hood in pepper fields in St. Vincent and the Granadines. **D. R. Seal**, M. Ciomperlik, M. L. Richards, and W. Klassen. University of Florida-IFAS, Tropical Research and Education Center, Homestead, FL

Spatial distribution patterns of *S. dorsalis* were determined using Taylor's power law and Iwao's patchiness regression. These results were compared with Index of dispersion, Mean crowding, Green's Index and Lloyd's `Patchiness' Index. *S. dorsalis* adults were aggregated on the terminal leaves irrespective of plot size. *S. dorsalis* larvae were also distributed in a clumped pattern on terminal leaves. On fruits, adults were aggregated in the small plots.

56. Management of the Sweetpotato Weevil in Louisiana. Tara P. Smith, **Abner M. Hammond**, and Tad Hardy. Dept. of Entomology, LSU Agricultural Center, Baton Rouge, La.

The United States is a major contributor to sweetpotato production with potatoes grown mainly in the states of North Carolina, Louisiana, Mississippi, California, Alabama and Texas. The sweetpotato weevil, *Cylas formicarius* Fab., is a major pest concern because of its damage potential and quarantine restrictions. The State of Louisiana has a mandatory insecticide spray program in the pink tag area of the state. Limited research has been conducted on new chemicals, such as the pyrethroids, to control this pest. The synthetic pheromone of the sweetpotato weevil has facilitated monitoring and trapping of weevils in commercial fields. A new insecticide-pheromone matrix has been developed and field tested. Research will be presented that addresses the State's program, new insecticide susceptibility experiments and the matrix developed to attract and kill male weevils.

57. Relationships between adult banded cucumber beetle (*Diabrotica balteata*) populations in sweet potatoes, harvest date, soil type, and larval root damage at harvest. **Richard Story**, Abner Hammond, Jeff Murray, Entomology Department, LSU, Baton Rouge, LA 70803

A study was conducted to determine the relationship between insect counts in sweet potato grower fields and

subsequent root damage at harvest. The effect of harvest date and soil texture on root damage was also investigated. Growers left an untreated strip (no insecticides) along the side of each field.

Mean *Diabrotica* adult capture through the season was positively correlated with percent rootworm damage in plots (r = 0.41). Day of harvest was likewise positively correlated with rootworm damage (r = 0.43). A regression analysis predicts percent rootworm damage as a function of mean *Diabrotica* in sweep nets and projected harvest date. Soil organic matter and percent sand, silt, and clay were not correlated with rootworm damage.

58. *Diaprepes, Phytophthora*, and hurricanes: Differential growth and survival of Hamlin orange trees budded to five rootstocks in an experimental grove. **Robin J. Stuart**, Clayton W. McCoy, and William S. Castle
Citrus Research and Education Center, IFAS, University of Florida, Lake Alfred, FL 33850

The Diaprepes root weevil, *Diaprepes abbreviatus* (L.), in combination with *Phytophthora* spp. causes one of the most severe decline syndromes known in Florida citrus. We compared the growth and survival of Hamlin orange trees budded to five rootstocks in an experimental grove near Poinciana, FL. Both DRW and *P. nicotianae* are present and catastrophic tree decline is symptomatic. The results demonstrate the importance of proper rootstock selection and prudent pesticide applications in combating this pest.

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