

**FLORIDA ENTOMOLOGICAL SOCIETY
2006 ANNUAL MEETING ABSTRACTS**

Pioneer Lecture

Woodruff, Robert. **Dr. L. A. Hetrick as a Florida pioneer in entomology teaching**

Because our honoree, Dr. L.A. Hetrick, was my advisor for my PhD degree, I have gone back to that time, nearly 50 years ago, to reminisce. A sharp contrast exists between degree requirements, living conditions, and technology of then and now. I am thankful to have been in that generation. What was it like to be a student at UF during that time?

Biography of Robert Woodruff

Dr. Robert Woodruff was born on 20 July 1933 in Kennard, Ohio. He graduated in 1951 from Urbana High School in Ohio. He attended Wabash College before graduating with a BS in 1956 in Entomology at the Ohio State University. Bob received the PhD in 1967 from the University of Florida with a major in entomology and a minor in botany.

Prior to his employment in 1958 as a survey entomologist with the Florida State Plant Board (now Division of Plant Industry, Florida Department of Agriculture), he worked as a curator of the insect collection at Wabash College, an assistant in the Department of Natural History at the Ohio State Museum, a graduate assistant at the Ohio State University, and an entomologist at the Kentucky State Health Department. Until 1963 at the Division of Plant Industry, he coordinated the federal-state Cooperative Economic Insect Survey, with his responsibilities including field surveys, identifications, and reports for pests of turf, field crops, vegetables, fruit, pastures, and ornamental plants. From 1963, his emphasis changed to detection of foreign pests and primary identification of beetles and grasshoppers. He investigated biological control and pest management of pests from Latin America. His responsibilities included curating the Coleoptera and Orthoptera for the Florida State Collection of Arthropods which is the 5th largest in the US. His retirement as Emeritus Taxonomist was effective in August of 1988 after over 30 years of service.

Dr. Woodruff has published over 150 papers during his long, distinguished career. These papers were primarily in taxonomic (Scarabaeidae) and economic entomology. He is listed in seven directories including Who's Who in the South and Southeast, International Scholars Directory, Personalities in the South, and American Men of Science. He is active in the Association of Tropical Biology, the Coleopterists Society (Past President, 1978; Editor, 1972-1977), the Entomological Society of America presently Emeritus, the Florida Entomological Society (Associate Editor, 1969-1977) presently Emeritus, Gamma Sigma Delta, Phi Kappa Psi, Sigma Xi, Sociedad Mexicana de Entomologia, the Center for Systematic Entomology (President, 1986-1987, 1995-1996; Board of Directors 1995-present), and the Gainesville Gem & Mineral Society (President 30 years). He has been very active in editing and serving on editorial boards for 8 journals including the 'Coleopterist's Newsletter', the 'Coleopterist's Bulletin', 'Insect World Digest', and 'Insecta Mundi'. He received funding from the United States Public Health Service, the National Science Foundation, the Smithsonian Institution, the United States Department of Agriculture, the United Nations, the Food and Agriculture Organization, and various other national,

state, and university organizations. He has received 21 honors and awards, in addition to 29 species named for him. Dr. Woodruff is especially active in consulting throughout the Caribbean and Central America for numerous organizations including the Food and Agriculture Organization of the United Nations, the Peace Corps, and FAVACA (Florida International Volunteer Corps). Dr. Woodruff is currently completing the The Scarab Beetles of Florida and he is continuing his taxonomic research on the Scarabaeidae. He is well known for his booth at professional society meetings of entomology gifts and souvenirs emphasizing fossil insects in amber.

Abstracts of Presentations (in alphabetical order)

Adesso, K.M. & H.J. McAuslane **Behavioral response of pepper weevil, *Anthonomus eugenii* Cano, to oviposition plugs and associated ovipositional cues**

After ovipositing, pepper weevils cover their oviposition holes with a liquid anal secretion that hardens into a plug. In addition to protecting the egg, there is evidence that the ovipositional plug may function as an oviposition deterrent. We performed choice and no choice tests to tease apart the effect of fruit damage, female feeding damage, female frass, oviposition plugs, holes and eggs on further oviposition by females.

Arevalo, H. A., & O. E. Liburd **Economic Injury Level and Description of the Damage Inflicted by Flower Thrips, *Frankliniella* spp. in Early-season Blueberries**

The economic injury level and the description of the damage inflicted by flower thrips to blueberry fruits has been studied and described for the first time in two commercial rabbiteye cultivars, Climax and Tiftblue. We described feeding and emergence damage in the fruits and a direct positive correlation between thrips density and fruit formation. We also found non-significant differences in the tolerance or susceptibility to flower thrips between these two cultivars.

Ballard, J. & T. Anderson **Transmission of non-repellant liquid termiticide among subterranean termites**

There has been much discussion and research centered upon the subject of transmission of liquid termiticides applied to soil for the control of subterranean termites. It is clear that there is a relationship between the active ingredient selected, the concentration in the soil, and the length of time of exposure. A lab arena study was conducted that clearly demonstrates that transmission of acetamiprid can occur via two modes of action, both resulting in termite mortality.

Barbieri, G., M.D. Vitorino, & J.P. Cuda **Brazilian Peppertree Leaflet Gallling Psyllid *Calophya terebinthifolii* (Hemiptera: Psyllidae): Field Host Range and Impact Studies**

Brazilian peppertree, *Schinus terebinthifolius* Raddi (Anacardiaceae), is a highly invasive weed in Florida. The leaflet-galling psyllid *Calophya terebinthifolii* Burckhardt & Basset (Hemiptera: Psyllidae), a natural enemy of the plant, was investigated in the laboratory and field for its biological control potential. Preliminary host range studies, dispersal and field efficacy experiments were conducted at the Forest Nursery, Gaspar, and Forest Protection Laboratory, Blumenau, Santa Catarina, Brazil.

Bayer, B. & P. Koehler Pest Defense Tubes in the Wall is an insecticide delivery system composed of perforated plastic tubing, which is installed into the walls of homes during construction

This system is currently installed in more than 200,000 homes. The system was evaluated to determine the quantity of insecticide delivered by the tubes and its efficacy in controlling *Periplaneta americana* (L.) and *Camponotus* spp. Evaluations showed the quantity of insecticide delivered controlled these pests.

Box, J. R. Bedbug management in Hotels and Single Family Residence

PowerPoint Presentation with actual pictures of Bedbug management in a Hotel situation. Discussion of lack of control with Synthetic Pyrethroids and an upgrade to pyroles with and Insect Growth Regulator.

Box, R. The Re-Introduction of Cimex species Into the Residential/Commercial Arena in South Florida and New Management Techniques

Since 2004, there has been considerable bedbug activity as reported by pest management professionals in our company. We have developed new procedures for bedbug treatments and procedures for showing our customers how to prepare their living quarters for treatments. I also will discuss educational materials that we provide to hotel personnel in both English and Spanish. I will discuss several cases of bed bug infestations that I have encountered.

Boykin, L.M., R.G. Shatters, Jr., R.C. Rosell, C.L. McKenzie, R.A. Bagnall, P. De Barro, & D.R. Frohlich Global Relationships of *Bemisia tabaci* (Hemiptera: Aleyrodidae) revealed using Bayesian Analysis of mitochondrial COI DNA sequence

We utilized a Bayesian phylogenetic technique to resolve previously unresolved global relationships of the major races of *Bemisia tabaci*. All COI DNA sequence data available in Genbank for *B. tabaci* world-wide (369 specimens) were obtained and the first well - resolved phylogeny for the *B. tabaci* species complex was produced. Nine major well- resolved (0.70 posterior probability or above) races were recovered. Relationships of the nine major *B.tabaci* races are discussed.

Brlansky, R.H. Citrus greening disease: Another new disease for Florida citrus.

Citrus greening disease, or huanglongbing, is another new challenge for the Florida citrus industry. Citrus greening disease was first discovered in 2005 and after years of fighting citrus canker the discovery of citrus greening only adds to the problems for the Florida citrus industry. Economic important exotic citrus diseases such as citrus greening have been known for many years and their potential threat to Florida was evaluated. A number of new diseases and pest have been discovered in Florida citrus. These include the most efficient vector of citrus tristeza virus the brown citrus aphid, citrus canker, citrus leafminer and the Asian citrus psyllid. What is known about citrus greening, research that is needed and present management strategies will be presented.

Cabrera, B. Survey of Structural Wood-Infesting Beetles in Florida

A survey of structural wood-infesting beetles was conducted between February 2004 and February 2006. Beetles were sent in by pest control companies, extension agents, homeowners or were collected by the author. A total of 94 samples consisting of over 320 specimens were obtained including 11 bostrichinae, 5 dinoderinae, and 38 lyctinae. Most of these specimens were non-

endemic species. Infested wood products imported from overseas appear to be the source of many structural infestations in Florida.

Cabrera, B. Welcome and Introduction: An Overview of Bed Bugs

Bed bugs have returned as a household pest in the U.S. They are unique and are a challenge to control. In Florida, infestations have been reported in hotels, motels, apartment buildings, and private residences. Treatments vary by pest control company and research is desperately needed. Education and training on bed bug detection, control, and prevention should be a priority for the pest control and hotel and lodging industries, and public health and medicine, among others.

Carpenter, J. E., & O.G. Marti Cytological attributes in eupyrene sperm bundles of F1 sterile males: Relevance to the sterile insect technique (SIT) for Lepidopterans

During an SIT program against lepidopteran pests, traps monitoring populations and overflooding ratios may capture unmarked F1 sterile males that cannot be distinguished from wild fertile males. Therefore, we examined eupyrene sperm bundles to see if there were differences between normal and F1 sterile males. We discovered that F1 males (sterile) from irradiated fathers can be distinguished from fertile males by the homogeneity of chromatin material in nuclei cluster of eupyrene sperm bundles.

Cave, R.D. & C. Sciacchetano Temperature-dependent development of the cycad aulacaspis scale, *Aulacaspis yasumatsui* (Hemiptera: Diaspididae)

Egg incubation, nymphal development time, and preoviposition period of the cycad aulacaspis scale, *Aulacaspis yasumatsui*, were measured at 6 constant temperatures. Egg incubation increased from 9.0 to 15.5 days at 32 C and 20 C, respectively. Nymphal development time decreased from 46.5 to 19.7 days at 18 C and 25 C, respectively. Preoviposition period varied from 13.5 to 7.9 days at 20 C and 32 C, respectively. The scale's development time is compared to that of three of its natural enemies.

Cherry, R., C. Rainbolt, & R. Nagata Effect of Southern Chinch Bug on Weed Establishment in St. Augustinegrass.

This study shows that southern chinch bug damage to St. Augustinegrass provides an opportunity for weeds to become established. Even after chinch bug infestations are reduced through insecticidal and/or natural controls, the weed problem remains

Chiarelli, R.N., P.D. Pratt, C.S. Silvers, & T.D. Center Influence of Temperature and Humidity on Life History Characteristics of *Boreioglycaspis melaleucae* (Hemiptera: Psyllidae), a Biological Control Agent of the Invasive Tree *Melaleuca quinquenervia*.

The Australian native *Melaleuca quinquenervia* (Cav.) S. T. Blake is an invasive tree in South Florida that threatens biodiversity in the greater Everglades region. *Melaleuca quinquenervia* was first introduced to Florida in 1886 for agroforestry or horticultural reasons and has since spread aggressively, out competing native flora and forming dense monocultures. As part of a classical biological control program to establish top-down pressure on *M. quinquenervia* by reuniting the invasive plant with its natural enemies, the psyllid *Boreioglycaspis melaleucae* Moore was released in 2002 and established in the field. It remains unclear how *B. melaleucae* development, fecundity, and oviposition respond under a range of temperatures and humidities such as those found in southern Florida. The purpose of this study was to determine the influence

of temperature, humidity and host plant terpenoid profile (chemotype) on *B. melaleuca* stage-specific development times and survival, oviposition rate, and fecundity.

Cooper, T. **Ecological interactions between an invasive bromeliad-eating weevil, *Metamasius callizona*, and two host bromeliads in south Florida, *Tillandsia fasciculata* and *T. utriculata***

This paper looks at the ecological interactions between an invasive bromeliad-eating weevil, *Metamasius callizona* (Chevrolat), and two host bromeliads in south Florida, *Tillandsia fasciculata* Swartz and *T. utriculata* L. *Tillandsia fasciculata* propagates by seed and vegetative offsets; *T. utriculata* propagates by seed only. These two reproductive strategies result in different life histories for the plants, and different responses to the attack by *M. callizona*, specifically in seasonal patterns, survivability, persistence, and geographic movement.

Copeland, C.S., M. Hoy, A. Jeyaprakash, M. Aluja, & J. Sivinski **Cytochrome C Oxidase sequence data distinguish a thelytokous subpopulation of *Odontosema anastrephae* from a morphologically identical arrhenotokous subpopulation**

A thelytokous subpopulation of *Odontosema anastrephae* was collected from Vera Cruz State, Mexico, and compared to an arrhenotokous subpopulation of *O. anastrephae*. The two subpopulations were unable to be distinguished on the basis of morphology. Mitochondrial sequence analysis, however, revealed that they could be distinguished by their Cytochrome C Oxidase, subunit I (COI) sequences. Comparison with COI sequences of other wasps of the Figitidae suggested that these two morphologically identical subpopulations may be separate species.

Cox, D., D. Grosman, & J.J. Daccola **Innovation Under Pressure - Injecting Insecticides into Trees for Insect Control**

Trees are an important resource to life on earth. Protecting this resource from pestilence is becoming increasingly challenging with loss of broad spectrum chemicals, environmental concerns and an increasing number of exotic pest introductions. Tree injection equipment has evolved over the past decade to increase the use of this application technology on a broader scale. By injecting insecticides, many environmental and human exposure issues are minimized, with the benefit of increased and persistent control.

Epsky, N. D., A. Walker, T. Weissling & A. Meerow **Biology and Damage of an Undescribed Baridine Weevil on *Amaryllis***

The weevil subfamily Baridinae is comprised of several economically important species that cause damage to the roots and fruits of plants. In the early 1990's, a baridine weevil was observed feeding on and occasionally killing amaryllis (*Hippeastrum* Herb) plants in Florida. A survey was conducted to document grower awareness of this pest and laboratory research was initiated to gather information on its basic biology.

Ferguson, S. & O. Pineda **A Brief History of Leafminer Resistance Monitoring: From Bioassays to Molecular.**

The leafminer, *Liriomyza trifolii*, a pest of vegetable and ornamental crops, has developed resistance to a large number of insecticides. Since 1990, we have conducted resistance monitoring to determine the incidence and level of resistance to cyromazine and abamectin. Until 2004, leaf

dip bioassay was the test method used. Since then, we have developed molecular techniques, specifically PCR technology and now micro array technology, to detect resistance.

Frank J. H., R. K. Sprenkel, & N. C. Leppla ***Larra bicolor*: Spreading the wasps throughout Florida.**

Invasive *Scapteriscus* mole crickets (Orthoptera: Gryllotalpidae) have been the major pests of Florida's turf and pastures. In the 1980s, three classical biological control agents were introduced from South America and established. Stock of a wasp, *Larra bicolor* (F.) (Hymenoptera: Sphecidae), from Bolivia, was released in and near Gainesville in 1988. Fortuitous observations showed that it had spread to several counties by 2001. Our team of observers is working to detect it in all remaining counties.

Fraulo, A. B. & O. E. Liburd **Effect of Timed Releases of *Neoseiulus californicus* (McGregor) in Controlling the Twospotted Spider Mite in Strawberries**

Neoseiulus californicus has been shown to be an effective biocontrol agent for the twospotted spider mite in strawberries. A series of experiments were conducted to determine the time when *N. californicus* should be released. Results indicate that one early-season release may be able to achieve and maintain control throughout the season. Future work with GIS/hyperspectral imagery models will assess levels of mite damage as it relates to timed predatory releases.

Funderburk, J. & J. Sharma **Thrips Associated with Native Orchids in Northern Florida**

Eight species of native, terrestrial orchids in five genera were sampled in northern Florida. Thrips adults were collected in the flowers of each orchid species. Thrips larvae were collected in the flowers of five orchid species. Thrips represented four species of terebrantians from three genera and two species of tubuliferans. The nature of the associations between thrips and orchids will be discussed.

Hahn, D. A. **Why should you care about flesh fly storage proteins?**

Unlike vertebrates, insects can accumulate substantial amino acid reserves in hexameric storage proteins. I have identified the major storage proteins of the flesh fly, *Sarcophaga crassipalpis*, described their abundance during immature and reproductive development, and use this information to infer their functional importance in metamorphosis and reproduction.

Halbert, S. **Discovery and spread of Asian citrus psyllid and citrus greening.**

Asian citrus psyllid was found for the first time in Florida in June, 1998 in Delray Beach. In about 6-12 months, it became established in south Miami-Dade County. From there, it spread on locally grown *Murraya paniculata* plants to much of the rest of Florida through the discount store trade. Nearly all the subsequent county records were from retail stores. Huanglongbing (citrus greening disease) was found for the first time in Florida in August, 2005. Infected plants have been found as far north as Sarasota, Sebring and the northern boundary of St. Lucie County. Both residential and commercial citrus trees are known to be infected. Huanglongbing apparently has moved via both plant material and insect vectors.

Hall, D. G. **Asian citrus psyllid - biology and seasonal ecology**

The seasonal ecology of *Diaphorina citri* was investigated in a non-irrigated citrus grove of mature orange trees beginning January 2005 in east central Florida. No insecticides were applied

during the study. Predators including lady beetles, lacewings and syrphid flies were observed during the study, and a population of the parasitoid *Tamarixia radiata* was established in the grove. Phenology of *D. citri* was assessed weekly using counts of adults on yellow sticky cards (7.8 x 12.8 cm) placed in trees, counts of adults per pair of mature leaves, and counts of adults, eggs and nymphs on vegetative flush shoots. A mean of 150 adults/trap/wk was observed during one week of the study, but peak means of 30 to 50 adults/trap/wk were more common. A mean of 0.8 adults/leaf pair was observed during one week of the study, but peak means of 0.1 to 0.2 adults/leaf pair were more common. Peak means of 50 to 65 eggs/flush shoot and 40 to 65 nymphs/flush shoot were observed during the study. A mean of 2.0 adults/flush shoot was observed during one week of the study, but peak means of 0.5 to 0.8 adults/flush shoot were more common. Relative abundance of vegetative flush was assessed weekly by counting the number of foliar flush shoots within a 15x15x15 cm frame slipped into the outer edge of a tree with the end of a branch inside the frame. Means of 1 or more shoots per sample generally indicated an abundance of vegetative flush, with means of 1 to 4 shoots per sample constituting a minor to moderate flush and means of 5 to 10 constituting a major flush in this particular grove. Sticky traps and samples of mature leaves indicated that adult *D. citri* were present continually in the trees but sometimes at very low levels for extended periods of time. During fall and winter 2005-2006 when little or no flush was produced by the trees, mean numbers of adults dropped from 3.5/trap/wk to 0.0-0.5/trap/wk. Immatures and adults were consistently abundant during the summer months in association with vegetative flush and sometimes abundant during other times of the year in association with flush. No data were collected on infestations of *D. citri* on blooms, but general observations indicated populations did not develop on young blooms present in the grove during March 2005 nor during March 2006. Observations during a late bloom during May 2006 revealed *D. citri* readily oviposits and develops on young developing blooms. Earlier research (1998-2000) showed peak *D. citri* populations in Florida during the summer, relatively large populations during October-December, and low populations from December through May. Evidence to-date indicates outbreaks of *D. citri* in Florida citrus consistently occur during the summer but may develop at any time of the year depending on environmental conditions and the availability of flush.

Handler, A. M. & G. J. Zimowska **New transformation vectors for improved SIT and ecological safety in tephritid species**

To create transgenic tephritid fruit fly strains for biological control new genetic transformation vectors have been developed for improved sterile insect technique and improved ecological safety. For SIT, vectors have been tested that have strong red fluorescent thoracic phenotypes for field detection and fluorescent sperm for sperm identification and potential genetic sexing. A new vector system has been integrated into the Caribbean and Mediterranean fruit fly that allows post-integration transgene stabilization to ensure strain integrity.

Hertz, J. C. **Bed Bug Rearing and It's Obstacles**

The resurgence of bed bugs in the U.S. has left entomologist scrambling to reacquaint themselves with this once common blood-sucking pest. Laboratory rearing of this insect is essential to overcoming the educational and research gap that has developed over the last five decades. Research protocols, feeding methods, environmental conditions, and funding have been obstacles that researchers have had to face. I will discuss these obstacles and report on the status of the colonies at UF.

Hertz, J. C. **Evaluation of Fipronil-Impregnated Cords for House Fly Control**

The use of insecticide-impregnated cords was a common technique used to control filth flies in the mid-20th century. This study evaluated five different natural and synthetic fipronil-impregnated cords for potential use for house fly control. Each cord obtained effective control within 72 hours. Wool cord was significantly more effective than the other cords, having reached effective control at 24 h. Preliminary results indicate that fipronil-impregnated cords would be a useful tool for house fly control.

Hope, J. H. **Bed Bug Control - Field Trial Results**

The common bed bug, *Cimex lectularius*, is difficult to control. Treatment with insecticides is the most used strategy by pest management companies for effective control. There have been few reports on the outcome of insecticide treatments in field studies. Results of field trials conducted in 2005 from insecticide treatments will be reported

Houseworth, D. **Turf Insect Management, Acceptance of New Innovations in the Past and in the Present**

During the last 40 years there has been a tremendous change in the way insect pests are managed by turf managers. Advances in the biology of pests infesting turf, development of IPM programs, regulatory pressures, public attitudes towards use of pesticides and development of safer and more specific insecticides have required that turf managers constantly change the way they think about turf insect pest management and be amenable to looking at new ways of attacking old problems with new solutions. Some of the major changes to turf insect pest management over the last 40 years will be discussed.

Howard F. W. & G. S. Hodges **The West Indies mahogany scale, *Conchaspis cordiae*, an unusual scale insect recently found in Florida**

Conchaspis cordiae Mamet (Hemiptera: Conchaspidae) was recently found in Florida for the first time, and is now widely distributed in southeastern Florida. It has thus far been found in Florida only on mahoganies (*Swietenia* spp. and *Khaya* spp., family Meliaceae). Aspects of the biology of this unusual scale insect will be discussed.

Hunsberger, A., M. Crane, & C. Miller **Stop the Invasion: Empowering Teachers with Knowledge of Invasive Species**

To help educate the public about invasive species, we developed an educational program for school teachers to improve their knowledge of invasive plants and animals. Annual full-day trainings allowed teachers to identify invasive species, learn how insects are used as biocontrol agents, and tour natural restoration areas. A variety of lesson plans, classroom curriculum, and activities were provided for teachers to implement in the classroom. It was estimated that at least 6,000 students (3rd -12th grades) were taught this information each year.

Hunter, W. **Gene Expression in two leafhopper vectors of Pierces Disease of grapes, Glassy-winged sharpshooter and Blue-green sharpshooter**

Leafhopper vector biology was examined between two vectors of the bacterial pathogen *Xylella*, which causes Pierces Disease of grapes. Leafhopper cDNA libraries were used to examine genes linked to feeding. Homologous genes in both insects were compared and their importance to feeding and pathogen transmission is discussed.

Hunter, W. **Gene Expression in Asian Citrus Psyllid. Vector of citrus greening**

Psyllid biology was elucidated by genetic sequencing. Described is the first data set of expressed sequence tags, from *Diaphorina citri*, Asian citrus psyllid. The cDNA library was derived from adults due to their significance in spreading a bacterium which causes a serious disease of citrus, Huanglongbing, a.k.a. 'Citrus greening disease'. Over 5,906 cDNA clones were sequenced, to produce 2,123 total assembled sequences. The transcripts were annotated and identities to homologous genes will be discussed.

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

Many invasive species have gained a foothold in Florida by way of the Caribbean. The Center for Biological Control is conducting research offshore, in collaboration with Caribbean partners on species considered to be high risk threats. The goal is to generate essential knowledge to facilitate rapid action. Initial efforts are focused on two mealybugs, *Planococcus minor* and *Planococcus lilacinus*. Another component of the work is focused on documenting invasive species threats present in the Caribbean.

Kendra, P. E., M. K. Hennessey, E. M. Jones, W.S. Montgomery & N.D. Epsky **Backyard Composting of Infested Fruit: A Potential Pathway for Introduction of Anastrepha Fruit Flies (Diptera: Tephritidae) into Florida**

Disposal of infested fruit directly into the environment is a potential pathway for pest introduction. This study estimated the likelihood of exotic fruit flies entering south Florida through backyard composting. Grapefruits infested with Caribbean fruit fly larvae, *Anastrepha suspensa* (Loew), were discarded on outdoor compost piles and adult emergence was monitored for 30 days. Despite high mortality (~90%) from compost relative to control fruits, potentially-mated females emerged from 18 of 40 (45%).

Kern, W. H. Jr. **Africanized Honey Bees (*Apis mellifera scutellata*) training for First -- Responders in Florida**

The Africanized Honey Bees (*Apis mellifera scutellata*) was declared as established in Florida in 2005. First-responders (fire/rescue/police) are often called to emergencies that might involve these highly defensive bees. It is important for them to understand the need and types of protective clothing and how to neutralize an agitated AHB colony with materials available on their vehicles. Tests were conducted using Class A fire-fighting foam, Class B fire-fighting foam, AFFF fire-fighting foam, and dishwashing soap at 0.5, 1.0, 2.0, 5.0% concentrations to determine knockdown and mortality to honey bees.

Kern, W. H. Jr., & G. W. Hayes, Jr. **History of Africanized Honey Bees (*Apis mellifera scutellata*) in Florida**

The Africanized Honey Bees (*Apis mellifera scutellata*) is a subspecies of the introduced honey bee we are all familiar with. It was imported into Brazil from southern Africa in 1956. The goal was to improve the domestic honey bee to be better suited to tropical environments. Once they escaped management in 1957, they expanded their range in the Neotropics rapidly. They reached Texas by 1990 and then spread westward. AHB were expected to reach Florida by 1995. Interception monitoring and trapping at Florida's deep water shipping ports delayed this invasive subspecies from becoming established in Florida until after 2003. In 2005, the number of reports of authenticated AHB colonies in the state indicated that they had become established and was reported by the Florida Department of Agriculture and Consumer services. That same year,

FDACS, Division of Plant Industry funded an AHB Extension Project with the University of Florida.

Kern, W. H, Jr. Africanized Honey Bees (*Apis mellifera scutellata*) training for First Responders in Florida

The Africanized Honey Bees (*Apis mellifera scutellata*) was declared as established in Florida in 2005. First-responders (fire/rescue/police) are often called to emergencies that might involve these highly defensive bees. It is important for them to understand the need and types of protective clothing and how to neutralize an agitated AHB colony with materials available on their vehicles. Tests were conducted using Class A fire-fighting foam, Class B fire-fighting foam, AFFF fire-fighting foam, and dishwashing soap at 0.5, 1.0, 2.0, 5.0% concentrations to determine knockdown and mortality to honey bees.

Koehler, P. G. Impact of Africanized Bees on the Pest Management Industry in Florida

The discovery and spread of Africanized bees in Florida has resulted in a need for pest management services for this new pest. Bee management service has not been provided by most companies. The types of service needed by consumers for Africanized bees are swarm trapping, bee exclusion, swarm control, bee colony control, and bee colony removal. Pest control industry preparation for providing these needed services will be discussed.

Kostromytska, O. S. & Buss E .A. Biology and management of *Tomatus subtropicus* in St. Augustinegrass

Tomarus subtropicus Blatchley is a major pest of turfgrass along Coastal Florida. Based on soil sampling and black light trapping in southwest Florida, *T. subtropicus* is univoltine. Adult maturation, mating and oviposition in soil precedes flight activity by about 5 weeks. Grubs can feed on St. Augustinegrass, bahiagrass, centipedegrass, seashore papalum, bermudagrass and zoysiagrass roots. Preventive insecticides kill > 75% of first instars in the greenhouse, but commercial applicators have reduced efficacy on home lawns.

Legaspi J. C., M.A. Jervis & B.C. Legaspi, Jr. Ovigeny in selected generalist predators
Most of the research on ovigeny (egg production and development in adult female insects) and the ovigeny index (proportion of maximum potential lifetime complement that is mature at female emergence) has been performed on parasitoids. However, ovigeny should be applicable to insects generally. We documented the spined soldier bug predator, *Podisus maculiventris*, to be strongly synovigenic, which is the first study on ovigeny known in insect predators. We initiated a survey of ovigeny in predators across several genera.

Leibee, G. L. An Eriophyid Mite on *Loropetalum*

Loropetalum (especially cultivar `Ruby`) plants with symptoms of deformed leaves and shortened internodes are often infested with eriophyid mites. The use of miticides has presented mixed results. Studies were conducted to evaluate the efficacy of insecticides and miticides at controlling this mite. Carbaryl, followed closely by abamectin and dimethoate, was found to be the most effective at reducing damage and/or numbers of mites. Results also confirmed that the mite was the cause of the symptoms.

Leppla N. C. & J. P. Cuda. Common Myths About Lovebugs, Florida Folklore

The lovebug, *Plecia nearctica*, is a nuisance pest that is abundant for a few weeks each year in Florida in May and September. These small flies are a real bother for drivers but good for carwash businesses. They live for only a few days as they mate and disperse. The larvae are beneficial because they help recycle decaying organic matter. Lovebugs do not bite, sting, poison or spread diseases and they can usually be avoided.

Leppa, N. C. & J. L. Gillett **IPM Florida Success Stories, The First Five Years**

The Florida statewide integrated pest management (IPM) program addresses pests and plant diseases in agricultural, community and natural settings. New pest management projects have been developed and implemented in collaboration with researchers, extension agents, and stakeholders. The key to IPM Florida's success is developing strong partnerships

Li, H.-F. & N.-Y. Su **How do Formosan subterranean termites create tunnel space?**

A previous field investigation described the total length of an entire Formosan subterranean termites (FST) gallery system as 580 meters and the total space was estimated to be over 34,800 cm³. It has been speculated FST create tunnel space by compacting soil, because soil was seldom removed to a great extent. The objective of this study is to test this soil-compaction hypothesis. In this study, three group sizes, 50, 100, or 150 termites were introduced into two-dimensional arenas with sand substrate for tunneling. The density of unexcavated sand, and sand deposited by termites at 24 or 48 hrs was recorded. Contrary to the hypothesis, the deposited sand was less dense than the unexcavated sand in the all replications and thus we rejected the soil-compaction hypothesis. Instead, we offered another hypothesis that termites gain the tunnel space as a result of consuming wood. The bioassay with several pieces of wood and 100 termites was conducted. The volume of consumed wood in 30 days was significantly higher than the volume of feces. The increased space is approximately 50% of volume of consumed wood. Two mechanisms of creating space by consuming wood were discussed. First, metabolic reaction converts solid wood into metabolic gas. Second, lower density wood was converted into higher density feces.

Mankin, R. W. & P. W. Taylor **A comparative analysis of Mediterranean and Queensland fruit fly wing-buzzing sounds associated with mating**

Male Mediterranean and Queensland fruit flies both produce wing-buzzing sounds during courtship but the functional role of the sounds is not clear for either species. In further consideration of the roles of these sounds, we report on a video and acoustic analysis of Queensland fruit fly courtship bouts, and on comparisons with Mediterranean fruit fly courtship, as well as wingbeat frequencies of general flight.

Mannion, C.M. & J.E. Pena **Management of the Asian Citrus Psyllid, *Diaphorina citri* (Homoptera: Psyllidae) on Orange Jasmine**

The Asian citrus psyllid, *Diaphorina citri* is a pest of citrus and close relatives of citrus. This psyllid is an efficient vector of the bacterium that causes citrus greening. Orange jasmine, *Murraya paniculata*, is a common landscape and production plant in south and central Florida and is a host of the psyllid. High populations of the psyllid can be found on orange jasmine in the south Florida landscape. There has been increased interest in management of this pest with the recent confirmation of citrus greening in Florida. Currently there is a compliance agreement for growers shipping orange jasmine from infested areas. Surveys for natural enemies (predators and parasitoids) of the psyllid were conducted in one citrus grove and in several orange jasmine hedges in Homestead, FL. Predators (e.g., reduviids, chrysopids and syrphids) were commonly found

preying on the psyllid. Overall parasitism was less than 5 percent. Studies were conducted to determine the efficacy of pesticides on psyllid populations (eggs, nymphs, and adults) on orange jasmine. Insecticides commonly used for psyllids or other homoptera were applied either as foliar or drench treatments. Pyrethroids, neonicotinoids, and the combination products of pyrethroids plus neonicotinoids provided the best control.

McKenzie, C. **Detection and Spread of Biotype Q in the United States**

Biotype Q of *Bemisia tabaci* was first detected in the United States on poinsettias from a southwest retail outlet during Christmas 2004. Although indistinguishable in appearance from silverleaf whitefly (biotype B), these insects are much less susceptible to insect growth regulators and many neonicotinoid insecticides. Molecular techniques used to distinguish whitefly biotypes include esterase assays, COI DNA sequence, and microsatellites. During the past 18 months, biotype Q has been detected in 22 states and appears to be spreading.

Meagher, R. L., J. Brambila, & E. Hung **Searching for Exotic *Spodoptera* Species**

We used sex pheromone-baited traps to collect native and exotic *Spodoptera* spp. moths at an orchid nursery in Lake County, FL. Lures for *S. eridania*, *exempta*, *exigua*, *frugiperda*, *littoralis*, *litura*, *praeifica*, and *Pseudaletia unipuncta* were placed in bucket traps that surrounded the greenhouses of the nursery. No exotic species have been collected, but *S. albula* and *S. latifascia* were collected in traps with *exempta* lures, fall armyworm was collected in *frugiperda* lures, and southern armyworm was collected in *eridania* lures.

Mellinger, C. **Innovative IPM Preventive Practices for Tomato and Pepper**

The implementation of monitoring for beneficial insects in and around the tomato and pepper cropping systems has been a major contribution to preserve and/or increase the already existent bio-regulation of insect pests. Glades Crop Care has been using that approach to move growers forward in the IPM continuum. There are several examples of how that strategy has been implemented at the locations where Glades Crop Care provide services. Broad-spectrum and bio-rational insecticide applications are recommended based on the population dynamics of the pest and beneficials. Pest control recommendations based on chemical control are aimed to be implemented when they are less detrimental to the pest's natural enemies in order to preserve naturally existing bio-regulation. Also, studies conducted on pepper have demonstrated that thrips' populations are lower in pepper fields that had sunflowers as a companion crop. The lower number of thrips found in those fields can be attributed to the bio-regulation provided by higher number of the predator *Orius insidiosus* (Say) (Hemiptera: Anthocoridae). Another comprehensive study researching the population distribution of the pepper weevil, *Anthonomus eugenii* Cano (Coleoptera: Curculionidae), in the southwest part of Florida demonstrated that the pepper weevil utilizes black nightshade as an alternative host. Farmland areas in which black nightshade populations were reduced by cultural practices had significantly lower number of pepper weevils in the pheromone traps and in the crop.

Newsom L., V. Pedibhotla, J. Mitchell & T. Holt **Alverde® (Metaflumizone) A Novel New Insecticide for Control of Key Insect Pests in Vegetables**

Alverde® (metaflumizone) also known as BAS 320 I is a new semicarbazone broad-spectrum insecticide. Studies indicate that it has low toxicity to beneficial insects, pollinators, man, and other non-target species. The novel mode of action of Alverde® will make it an ideal candidate for insect resistance management programs in rotation with other modes of action

chemistries. Metaflumizone belongs to a new chemical class of sodium channel blocker insecticide (SCBI) that does not require bio-activation (metabolism) by insects to become active. Registration for Alverde® is expected by 4Q2006. Field trials indicate that Alverde® controls insects harmful to Florida vegetable production including such species as *Plutella*, *Pieris*, *Manduca*, *Trichoplusia*, and *Spodoptera*. Key crop segments submitted for EPA approval include potatoes, fruiting and leafy vegetables, cole crops, and cotton.

Northfield, T. D., & R. F. Mizell III **Access Curculionoidae: using a comprehensive weevil database to evaluate evolutionary trends**

A database has been created to store information on the superfamily Curculionoidea. The information can be used to look at evolutionary trends within the superfamily to make predictions about weevils that have not been studied. We used the database to evaluate trends in weevil semiochemical use, and found that pheromone use appears to have evolved at least three times within the superfamily. We have also noticed trends in pheromone complexity within monophyletic groups.

Nuessly, G. & R. Nagata **Greenbug Aphid Damage to Warm Season Turfgrasses**

A new biotype of greenbug aphid, *Schizaphis graminum* (Rondani) (Hemiptera: Aphididae), was discovered feeding on seashore paspalum turfgrass in Belle Glade, Florida in November 2003. Damage to warm season turfgrasses consists of water soaked lesions surrounding feeding sites within 24 hr followed by chlorosis and necrosis of leaf tips or entire blades within 96 hours. Sensitive grasses include varieties of seashore paspalum, zoysia grass, and Bermuda grass.

Nyoike, T. & O. Liburd **Effect of living and synthetic mulches with and without a reduced risk insecticide for the control of whiteflies and aphids in cucurbit**

Whiteflies and aphids are key insect pests in Florida cucurbits. To manage these pest densities and their related problems living mulch (buckwheat) and synthetic mulches (reflective and white) with and without a reduced-risk insecticide (Admire 2F) were evaluated. Results indicated that living mulch had a higher mean number of natural enemies compared with other treatments. Overall, reflective mulch with the reduced-risk insecticide reduced whitefly and aphid densities and had higher yields.

O'Meara, G. F. **Oslo Riverfront Conservation Area: the land surrounding the Florida Medical Entomology Laboratory**

The Oslo Riverfront Conservation Area (ORCA), a 442 acre preserve, was established with public funds to protect endangered ecosystems/species, to safeguard water quality in the adjacent Indian River Lagoon and to provide for passive recreation. Activities conducted by Florida Medical Entomology Lab on behalf of ORCA include: (a) securing grants for the construction of trails, viewing platforms, interpretive signs and for the removal of invasive exotic plants; (b) providing environmental education programs; and (c) training nature guides.

Osborne, L. S. & Scott Ludwig **What is Biotype Q and Where Did It Come From?**

In 2005, the Q-biotype of *Bemisia tabaci* was identified in the United States by scientists at the University of Arizona. This biotype has been found in ornamental production systems. I will discuss the response by the ornamental industry to this new threat to U.S. agriculture.

Oetting, R. **Insecticide Efficacy Trials Against the Q Whitefly on Greenhouse Crops**

Bemisia tabaci strain 'Q' is a new introduction into the US. This strain has been reported to have resistance to conventional chemical controls. New chemistries and standard controls were tested in GA greenhouses. *Beaveria bassiana* (Naturalis & Botanigard), dinotefuran (Safari), flonicamid (Aria), spiromesefin (Judo), acetamiprid (Tristar) and BYI8330 reduced 'Q' whitefly populations over the trial period. Whitefly populations showed lower levels of efficacy for the neonicotinoid compounds (Marathon and Flagship) in the trials.

Paige, J. MaxForce TMS®: Cooperative Development of a Nontraditional Product

Over the course of 5 years, the Maxforce Tick Management System was developed cooperatively between Bayer Environmental Science and the Center for Disease Control. The basis for the non-traditional system involves a non-lethal food material that attracts rodents into a plastic box whereupon the rodent contacts a fipronil treated wick. The dose of fipronil is sufficient to kill the ticks but does not harm the rodents. Placement of these boxes in Lyme disease prone areas in the Northeast USA resulted in 85-98% reductions in tick on rodents, and the product was registered by USEPA in 2003.

Paige, J. The Bed Bug Problem from an Industry Perspective

Since bed bugs have returned as a pest, pesticide manufacturers have been intent on developing effective products. We will discuss efforts that are currently underway for developing and testing an effective bed bug control product.

Pereira, R., J. Sivinski & P. Teal Influence of a Juvenile Hormone Analog and Dietary Protein on Male Caribbean Fruit Fly, *Anastrepha suspensa* (Diptera: Tephritidae), Sexual Behavior

The effects of application of a juvenile hormone analog, methoprene, and dietary protein on male Caribbean fruit fly sexual success were evaluated in the four possible combinations of the two factors (methoprene application and protein supply). Laboratory, field cage, and greenhouse experiments compared male sexual performance. The substantial improvement in male sexual performance due to the methoprene application, protein supply, and interaction of methoprene and protein, and an earlier sexual maturation due to methoprene application have the potential to produce more efficacious sterile males for SIT programs.

Polston, J. E. The Potential of Biotype Q as a Vector of Plant Viruses in the United States

Bemisia tabaci biotype Q has been found in multiple locations in Florida. This has elicited concerns regarding the impacts that this biotype will have as a pest but also as a vector of plant pathogens. Little information is available on the transmission differences between biotypes B and Q. However, there are biological differences between these biotypes that suggest that there will be changes in viral etiologies if the biotype Q becomes the dominant whitefly in Florida.

Price, J. F. Some Strawberry Growers' Arguments Against Biological Control of Twospotted Spider Mite, *Tetranychus urticae* Koch

Growers' arguments opposing biological control of twospotted spider mite in strawberries include, (1) all costs are incurred in the early season, (2) use of some favored pesticides is preempted, (3) modern miticides are effective and easy to use, (4) biological control is more difficult than miticidal control, (5) costs for late infestations are higher biologically than chemically,

(6) spider mites can develop excessively before predators effect control. Some counter-arguments will be presented.

Rangasamy, M., B. Rathinasabapathi, H. J. McAuslane, R. H. Cherry, & R.T. Nagata
Oxidative Responses of St. Augustinegrasses Challenged by Southern Chinch Bug, *Blissus insularis* Barber (Hemiptera: Blissidae)

Southern chinch bug is a serious insect pest of St. Augustinegrass. Two lines of this grass 'FX-10' and NUF - 76 are known to exhibit a high level of resistance to southern chinch bug. The role of oxidative enzymes such as polyphenol oxidase, peroxidase, catalase and lipoxygenase against Hemipterans has been documented. The involvement of such enzymes in southern chinch bug resistance in St. Augustinegrass is being evaluated and results will be presented.

Rogers, M.E. **Prospects for developing an IPM program to suppress Asian citrus psyllid populations and incidence of citrus greening disease**

As citrus greening continues to be reported in new locations in Florida, citrus growers are faced with difficult decisions on how to best manage this disease. Managing the psyllid vector of this disease is the primary means Florida citrus growers are employing in attempts to slow the rate of disease spread. In past years, with the absence of citrus greening in Florida, little attention was paid to developing management programs to suppress psyllid populations. The parasitoid, *Tamarixia radiata*, was introduced and successfully established in Florida but provides little control of psyllid populations in the early part of the year when psyllid populations increase at a rapid rate. Use of insecticides is currently the primary means Florida citrus growers use for suppressing psyllid populations. Widespread repeated application of the commonly used insecticides for psyllid control will likely result in the outbreak of pest insects typically maintained below damaging levels by the action of established natural enemies. Currently, a citrus IPM plan centered on suppression of D. citri populations is being developed to provide Florida citrus growers with the tools and knowledge needed to manage psyllid populations while minimizing the potential for development of other pest problems.

Roubos, C., O. E. Liburd, & S. Weihman **Evaluation of Trap Design and Color to Improve Grape Root Borer (Lepidoptera: Sesiidae) Monitoring**

Bucket traps and wing traps were compared as monitoring tools for grape root borer, *Vitacea polistiformis* Harris, a serious pest of grapes in Florida. Bucket traps caught significantly more grape root borer. In another study, different colored (blue, white, green, and yellow) bucket traps were evaluated for monitoring grape root borer. Green and yellow traps caught significantly more grape root borer males than white or blue traps.

Ruiter, R. M. ***Amblyseius swirskii*; a revolutionary biological tool in the fight against whitefly and thrips**

Amblyseius swirskii has become commercially available two years ago and in one year ago in the US. Prior to the introduction as a biological agent a collaborative selection process of several predatory mites took place. The collaboration between Koppert and PPO (Dutch research station affiliated with the Wageningen Agricultural University) resulted in the selection of *swirskii* as the best candidate. This presentation talks about the research resulting in the selection of *Swirskii*, the biological characteristics of *Swirskii* and the practical experiences gained over the past year in the US and past years in Europe.

Ryser, B., C. Riegel & B. Yokum **Treating Formosan Termite Infested Trees in New Orleans City Park**

This field study evaluated acetamiprid, acetamiprid plus bifenthrin solution and bifenthrin insecticides to treat formosan termite infested trees in New Orleans City Park. Protocols were developed to deliver insecticides to the inner cavities of infested trees. Follow-up assessments of trees and in ground monitors were done at 30 day intervals. One year data indicate acetamiprid alone outperformed both acetamiprid combination product as well as bifenthrin. Additional work is needed to replicate results.

Sandhu, H. & G. Nuessly **Effects of cane trash on Lesser Cornstalk Borer (Lepidoptera : Pyralidae) damage to sugarcane**

The lesser cornstalk borer, *Elasmopalpus lignosellus* (Zeller) attacked the young sprouts of sugarcane causing `dead hearts` and symmetrical rows of holes in the leaves. Plots with cane trash and without cane trash in both plant cane and stubble cane were set up for the study. Fewer number of plants with dead hearts and holes in the leaves were observed in plots with trash as compared to plots without trash. More damage was noticed in plant cane than stubble cane.

Scherer, Clay & G. Cashion **Advion®: New Bait Products for Cockroach Control**

Indoxacarb is a unique insecticide, the only member of the oxadiazine class of chemicals. It has been classified as a reduced risk product, highly effective at low doses, even toward bait averse cockroaches.

Schuster, D., T. Dennehy, & I. Denholm **Insecticide Resistance in Biotype Q**

Biotype Q of *Bemisia tabaci* was first detected in the US because of its resistance to insecticides. The biotype originated in the Mediterranean area and exhibits stable resistance to nicotinoid, pyrethroid and insect growth regulator insecticides. Comparisons with biotype B, the current biotype attacking agronomic and horticultural crops in the US, will be made.

Seal, D. R. & W. Klassen **Development of chilli thrips, *Scirtothrips dorsalis* Hood on selected crops**

Various parameters of chilli thrips, *Scirtothrips dorsalis* Hood were studied in a greenhouse. The mean numbers of larvae, pupae and adults were the highest on cotton plants followed by rose, pepper and other crops. The development period was shortest in cotton and rose followed by others. Size of various development stages did not vary among the host crops. Innate capacity of natural increase (rm) was the highest on cotton than on any other host crop.

Sethi, A., H. J. McAuslane, H. T. Alborn, R. T. Nagata, & G. S. Nuessly **Extracts of Romaine Lettuce Latex Deter Feeding of Banded Cucumber Beetle (Coleoptera: Chrysomelidae)**

Latex is a known defense against certain herbivores. Two romaine lettuce cultivars, Valmaine (resistant) and Tall Guzmaine (susceptible), were selected to study the potential of latex as a defense against banded cucumber beetle, *Diabrotica balteata* LeConte. Latex from Valmaine strongly inhibited *D. balteata* feeding compared to Tall Guzmaine when applied to the surface of artificial diet. Water, methanol and methylene chloride were tested to extract active compounds from latex, but only the methanol:water (8:2) extract strongly inhibited beetle feeding. The results suggest that moderately polar compounds in latex may account for resistance in Valmaine to *D. balteata*.

Shapiro, J. P. & S. M. Ferkovich **Effects of Nutrients from Moth Eggs on Fecundity of the Predator *Orius insidiosus***

Nutrition derived from the prey of female insect predators often results in higher oviposition rates than that derived from artificial diets. Toward our goal of discovering nutritional diet supplements for predators, we are isolating oogenic biochemicals from a common factitious prey, eggs of the flour moth *Ephestia kuehniella*. We will describe the isolation and bioassay of active fractions from *Ephestia* eggs, and discuss which specific components are most likely to be active.

Shirk, P.D., R.B. Furlong, J. L. Gillett & H. Bossin **Functionality of JcDENV-Derived Somatic Transformation Vectors in Insects and the Role of Viral Enhancer Sequences**

Stable somatic transformation (ST) of insects following microinjection of syncytial embryos or by transfection of cells lines can be achieved by integration of plasmids containing the *Junonia coenia* lepidopteran densovirus (JcDENV). We assessed effects of sequence modifications including deletions and insertions of expression cassettes on the efficiency of ST in Lepidoptera and Diptera. These modifications demonstrate that ST is dependent on ITR sequences and that transcription is influenced by sequences within the densovirus genome.

Sims, K. **Thripinema fuscum parasitism reduces both the feeding of *Frankliniella fusca* (Thysanoptera: Thripidae) on peanut and the transmission of Tomato Spotted Wilt Virus**

Frankliniella fusca is the main vector of Tomato spotted wilt virus (TSWV) in peanut. The parasitic nematode *Thripinema fuscum* sterilizes female thrips thus reducing both vector levels and the spread of TSWV. Potentially, parasitism may influence virus acquisition. The objectives of this study were to determine the effects of parasitism on *F. fusca* feeding and on TSWV transmission rates. Results demonstrated that *T. fuscum* parasitism reduced feeding and TSWV transmission by *F. fusca*.

Smith, J. A. & P. G. Koehler **Changes in Gut Carbohydrolase Activities in *Reticulitermes flavipes* Workers in Response to Hardwood, Softwood and Cellulose Diets**

Cellulolytic and xylanolytic gut activities were assayed in *Reticulitermes flavipes* workers fed on three diets: oak, pine and paper. Activities were assayed separately for the foregut, midgut and hindgut regions of these termites. Endogenous cellulolytic activities, located in the foregut and midgut, were highest on paper and lowest on oak. Symbiont cellulolytic and xylanolytic activities, located in the hindgut, were lowest on paper and highest on oak. Xylanolytic activity levels corresponded to dietary xylan content.

Stansly, P. A. & J. A. Qureshi **Biotic Mortality of Asian Citrus Psyllid Populations in Southwest Florida**

Cohorts of ACP on emerging foliage in a citrus grove were followed from egg to emergence over most of one year. Over 90% mortality was observed in unprotected cohorts, while the majority of psyllids developed successfully when protected by an organdy sleeve cage. Results with sticky barriers and cages of coarser material were intermediate. Predation from ladybeetles on early instars appeared to be the predominant cause of mortality observed in all treatments except the organdy cage.

Stansly, P.A. **Development of Biologically Based Management Systems for Whiteflies in Greenhouse Vegetable Production**

Use of insect netting and virus-resistant varieties has provided a more compatible environment for biological control of whiteflies in greenhouses. *Encarsia formosa* has been successful against *T. vaporariorum*, and marginally so against *B. tabaci*. *Eretmocerus eremicus* which is equally effective against both whitefly species but has been largely supplanted by *E. mundus* for *B. tabaci*. Interest in and use of phytozoophagous mirids in the genera *Macrolophus*, *Dicyphus* and *Nesiochorus* has been steadily increasing, and the predaceous mite *Amblyseius swirskii* looks promising on pepper but not tomato. Integration of these with biological and chemical controls of other greenhouse pests remains a challenge.

Sugrue, P., & N. Nolen **Treating Bed Bugs 'Old School' Style**

Techniques used by our company for controlling bed bugs will be discussed. We take a standard approach of thorough inspections followed by insecticide application with follow-up inspections and treatments, if necessary. Cooperation from the customer such as reducing clutter, and cleaning bedding material and other potential bed bug harborages is also important for more effective control.

Tate, C. D. & J. E. Carpenter **Mass Rearing of *Cactoblastis cactorum*: An Evaluation of Mating and Egg Production in the Laboratory**

Mass rearing of the cactus moth, *Cactoblastis cactorum* (Berg), on artificial diet is an integral component of the Sterile Insect Technique/F1 Sterility Area-Wide Management Program against this invasive pest. Currently, continuous production on artificial diet is difficult. Production is restricted due to inadequate mating and egg production, which may be a result of artificial diet or rearing conditions. In this study, we evaluated the effects of environment on mating and egg production.

Thoms, E., J. Eger, M. Messenger, B. Cabrera, & C. Riegel **Evaluation of quarterly replenishment of Recruit IV termite bait using testing protocols required by Florida Rule 5E-2.0311**

Toapanta, M., D. Schuster, R. Cordero, L. Buckelew, & R. Steffens **OBERON®: a new resistance management tool for whitefly control in vegetables**

Oberon® contains a novel insecticidal and acaricidal active ingredient, spiromesifen, from the new chemical class of spirocyclic tetronic acids. In field tests conducted between 2000 and 2005 in Florida, Oberon, as a 240 g AI/liter suspension concentrate (SC) formulation, at rates ranging from 100 to 150 g AI/ha provided excellent residual control of *B. argentifolii*. Baseline toxicity data for Oberon 2SC against *B. argentifolii* populations have been collected as part of a resistance management program and will be discussed.

Whitson, M. **The Human Side of Bed Bug Infestations**

Bed bug infestations are unlike any other type of household insect infestation. Residents whose living space has bed bugs suffer a variety of emotions from disgust, fear, excessive worry, frustration, anger, and desperation. Some sufferers can become social outcasts when their friends and family find out they have bed bugs. Explaining the situation and what needs to be done are crucial in getting cooperation and reassuring the customer. Specific examples will be discussed.

