SERA-IEG3 2007 ANNUAL REPORT FOR ALABAMA

Henry Fadamiro

PROGRAM MANAGEMENT:

The mission of the Alabama Integrated Pest Management (IPM) program is to facilitate implementation of economically and environmentally sound IPM practices in traditional and non-traditional agriculture in Alabama. The program is a diverse and interdisciplinary effort driven by stakeholder needs and enhanced by collaboration between IPM specialists and other stakeholders. Alabama currently has active IPM programs in the following key commodity areas/settings: cotton, grain crops, soybeans, peanuts, pasture and forage crops, ornamentals and turf, vegetable crops, citrus, peaches and school IPM. The Smith-Lever 3(d) funds were used to leverage additional funding for some of these programs. For the 2006-2008 planning cycle, Alabama has set aside a significant portion of its Smith-Lever 3(d) funds for the Alabama IPM Competitive Minigrant Program to provide small (seed) grants for IPM education, extension, demonstration, and implementation projects in the state. The Alabama IPM program is managed by the state's IPM coordinator (Dr. Henry Fadamiro) with inputs from the Alabama IPM Advisory Board (note that the program pays only the 3-month summer salary of the IPM coordinator annually). The board consists of a diverse array of IPM stakeholders (faculty/specialists, extension agents, farmers/producers, industry representatives, and state/regulatory agency representatives) from across the state, and meets 1-2 times each year to suggest and set IPM priorities for Alabama.

PROGRAM DELIVERY:

The Alabama IPM Program funded 16 IPM minigrant projects for total of $50,000 during the 2007 funding cycle (March 1, 2007 – February 29, 2008). Funded projects covered different pest organisms (i.e. diseases, insects and weeds) and commodity areas/settings. A list of funded projects is available online at www.alabamaipm.com. In February 2008, a RFP was issued for 2008 IPM minigrants. The proposals are currently being reviewed. The IPM coordinator continues to maintain that Alabama IPM website, which was established in November 2005. This website is available at http://www.aces.edu/anr/ipm/. In order to facilitate ease of access by stakeholder we purchased the name www.alabamaipm.com. The website contains information on program objectives, activities, personnel, IPM information on various commodity areas in Alabama, IPM-related news, links to Alabama IPM publications and crop profiles, as well as links to the Southern Region IPM Center, IPM programs for other southern states, and relevant federal and state websites.

The Satsuma citrus and peach IPM programs are two examples of programs emphasized in 2007. Through a grant from the Environmental Protection Agency-Strategic Agricultural Initiative (EPA-SAI) program awarded to the IPM Coordinator, an IPM workshop was conducted in 2006 for citrus growers and extension agents in Alabama. Growers and other participants were trained on various IPM practices including identification of pest and beneficial organisms, sampling techniques, biological control, pesticide use and safety and sprayer calibration. The IPM Coordinator also received another grant from the EPA-SAI program to develop and evaluate IPM practices for peach pests in Alabama. In addition, crop profiles are being developed for key fruit crops in Alabama using grants obtained from the Southern Region IPM Center (SRIPMC), Raleigh, NC. A new crop profile for Satsuma mandarin in Alabama

(Fadamiro et al., 2007) was completed in 2007. This document is available online at: http://www.ipmcenters.org/cropprofiles/docs/ALsatsumamandarin.pdf and http://www.aces.edu/anr/ipm/crop_profiles/a_satsuma_citrus.pdf.

Other programs with significant accomplishments during 2007 include Soybean IPM, School IPM, and Fire ant IPM programs. The IPM coordinator has also initiated a new research and extension project focusing on the development of OMRI-acceptable control tactics for yellowmargined leaf beetle (*Microtheca ochloroma*) and other key pests of organic vegetable production in Alabama. This project has recently received funding from the SRIPMC and the USDA/IR-4 program. The IPM coordinator also compiled and submitted to the SRIPMC an IPM-related expertise list for Auburn University and Alabama.

PROGRAM INVOLVEMENT:

The Alabama IPM Coordinator continues to work cooperatively with local research and extension staff and other stakeholders and with the SRIPMC to set IPM priorities for Alabama and to coordinate and promote existing and new IPM programs in the state. The program continues to collaborate with several other related programs in the state including the Plant Pest Diagnostic Laboratory, Alabama Cooperative Extension System, and the Alabama Fire Ant Management Program., Alabama's School IPM Coordinator, IR-4 Coordinator, SARE Coordinator, Organic Agriculture Coordinator, and Pesticide Safety Education Program Coordinator. The Alabama IPM coordinator participated in a workshop organized in 2006 by the SRIPMC to facilitate collaboration in IPM programming between 1862 Land Grants and 1890 Land Grants and has been working to facilitate productive collaboration between IPM specialists at Auburn University (Alabama's 1862 Land Grant institution) and their counterparts at the two Alabama's 1890 institutions (Tuskegee University and Alabama A&M University). Currently, the Alabama IPM coordinator serves as Chairperson of the Southern Region IPM Center Advisory Council and also on the center's Steering Committee.

ADMINISTRATIVE SUPPORT:

Administratively, the Alabama IPM program was supported by the Directors of the Alabama Cooperative Extension System (ACES) and the chairman of the Entomology and Plant Pathology Department at Auburn University. However, no accounting or secretarial staff are assigned specifically to the program, making day-to-day coordination of the program and management of the account a challenge. The ACES Financial office declined to establish individual accounts for the IPM minigrant projects and the situation has made the IPM coordinator into a near full-time book keeper.

SERA-IEG3 2007 ANNUAL REPORT FOR FLORIDA

Norm Leppla and Jennifer Gillett

PROGRAM MANAGEMENT: IPM Florida has been in place since 2001 and has had a full-time IPM Coordinator since its inception and full-time Associate IPM Coordinator for the past three years. Total annual 3(d) funding is about $179,000 and the state adds the coordinator's salary plus approximately $10,000. The program shares control of the 3(d) funds with the Associate Dean for Extension and less than 50% of the funds are used for salaries. The IPM Florida program is expanding rapidly and encompasses agriculture, communities and natural areas. Extramural funding was obtained to support cooperators: "Graduate Training for Plant and Crop Biosecurity, Food and Agricultural Sciences," National Needs Graduate Fellowships (Plant Medicine); "Protecting Children's Environmental Health," SRIPM Enhancement (School IPM); "Landscape IPM," SRIPM Extension (TAMU); "Pesticide Drift," SAI (Florida Department of Agriculture and Consumer Services); "wikiIPM: A Rich Internet Application to Support IPM Education and Training," SRIPM Enhancement (SPDN); "Landscape Maintenance Manual," UF/IFAS Extension Enhancement (Extension); and "Organic vegetable Production," UF/IFAS Extension Enhancement (Horticulture). The USDA, CSREES National Needs Fellowships will support three new Plant Medicine students to join IPM Florida. Technical support was at an adequate level and included two of the best Plant Medicine students, one excellent M.S. student, and highly experienced personnel from the Entomology and Nematology Department (information technologies, graphics, administrative). The IPM Florida management structure on the website (http://ipm.ifas.ufl.edu, About Us) was followed with extra emphasis on communication (especially website content), IPM guides, funding for cooperators, education and training, collaboration with Cooperative Extension, and regional and national liaison. Planning and priority setting were accomplished by conducting nine IPM Florida Group meetings with written accomplishment reports required by all of the participants. These reports were based on logs and work schedules maintained according to the IPM Florida Employment Agreement (website, About Us). Program recognition continues to increase through use of the IPM Florida logo by cooperators, distribution of the "Integrated Pest Management in Florida" DVD, delivery of labeled rulers and hand lenses, and application of IPM Florida stickers to materials and communications. The "IPM Florida, First 5 Years!" brochure continued to be popular. The director was given a certificate of appreciation for contributions from the IOBC, Arthropod Mass-Rearing and Quality Control Working Group. The associate director received one of the first Southern Region Friends of Southern IPM awards and was elected to the UF Joint Senate-Presidential Sustainability Committee. IPM Florida was awarded four UF/IFAS Image Awards for outstanding Extension materials.

PROGRAM DELIVERY: Maintenance of the IPM Florida website continued to be a time-consuming priority accomplished by Plant Medicine students. The 250 to 300-member distribution list for IPM information was combined with the UF/IFAS Extension Statewide Goals and Focus Areas list for "Plant, Animal and Human Protection" co-chaired by IPM Florida. The IPM Florida mini-grants program supported 16 projects for a total of $84,770 (website, Grants Showcase). The "Grower's IPM Guide for Florida Tomato and Pepper Production" was completed and placed on the website, including an educational screensaver and "Tomato and Pepper Insect ID Deck." A "Good Lawn Bug ID Deck" was produced and is for sale by the

UF/IFAS Extension Bookstore, a report on the NRCS, EQIP, Conservation Innovation Grants Program was prepared and circulated to the State IPM Coordinators, and contributions were sent for the SRIPM Center newsletter. Consultation is mostly by email; about 4,000 messages were sent this year. A considerable amount of time was invested in helping to organize grant proposal teams, two focused on pasture IPM for the new IPM-NRCS initiative and another, "Marketing IPM as Green School Technology for Southern Schools" for CSREES EIPM. IPM Florida personnel chaired or co-chaired four Doctor of Plant Medicine and three M.S. graduate committees, and had one graduate. Collaboration included Southern Plant Diagnostic Network first responder training, School IPM in-service training, and certified crop consultants continuing education. The benefits of IPM Florida were measured in terms of the number of collaborative projects initiated, completed and delivered to clientele groups, plus publications, presentations, grants, and consultation, including education and training (website, by category).

PROGRAM INVOLVEMENT: Collaboration with Cooperative Extension was extensive, particularly participation at county and statewide meetings, especially the annual Extension symposium, and helping to manage the mini-grant projects. IPM Florida personnel chaired the FAMU Center for Biological Control Advisory Committee and the EPA Soil Fumigant Stakeholder Meeting, and contributed to meetings of the Florida State Horticultural Society, Florida Entomological Society, and other state organizations. Additionally, a novel Extension/research project has been initiated on IPM in graduate housing at UF. A "Landscape Maintenance Manual and Online Training Modules" project is about 50% completed and a new IPM guide has been initiated on citrus. A Certificate in Plant Pest Risk Assessment and Management was established as an enhancement of the Plant Medicine program in cooperation with USDA, APHIS in Raleigh, North Carolina and FAMU Center for Biological Control. The primary interdisciplinary project was pasture IPM that involved agronomy, plant pathology, and agricultural and biological engineering, as well as entomology. Also, the mini-grants review panel includes all but one of these disciplines. IPM Florida collaborated statewide from Jackson County in the panhandle south to Miami-Dade County. This included the mini-grants program, IPM training, Extension meetings, and more than 30 invited talks. Cooperation continued with the Florida Master Gardener program and was established with the Florida Master Naturalist program. It increased with the SPDN and USDA-APHIS Cooperative Agricultural Pest Survey (CAPS) program. IPM Florida helped to draft a strategic plan for the Association of Natural Bio-control Producers (ANBP), served on the Advisory Council for the Southern Region IPM Center, chaired the State IPM Coordinator's group (SERA-IEG3), served on the Steering Committee for the International IPM Symposium, and helped to organize the SYSCO sustainable IPM conference.

ADMINISTRATIVE SUPPORT: IPM Florida received full support from the chairman of the Entomology and Nematology Department, the UF/IFAS administration, and key clientele groups. Accessing 3(d) funds continues to be difficult due to UF/IFAS accounting procedures. Professional development opportunities involved participation in meetings around Florida, and at Washington D.C. (National IPM Committee, students at NNF workshop), Montreal (IOBC, AMRQC; ANBP), Raleigh (SRIPMC), Starkville (Mississippi, Insect Rearing Workshop), Boston (American Chemical Society), and Knoxville (ESA-SEB), along with a Statistical Analysis System (SAS) course.

SERA – 003 Report for Georgia

March 27, 2008

Paul Guillebeau, IPM Coordinator
Department of Entomology
UGA
Athens GA 30606
bugman@uga.edu

Cotton

Over the last decade, cotton acreage in Georgia has increased nearly 300% (1.4 million acres in 2006). Elimination of boll weevil and the introduction of Bt cotton are responsible for most of the increase. However, since most insecticides sprays were eliminated, stink bug has emerged as an important pest.

Stink bug is difficult to control because it attacks a variety of crops, including soybeans, peanuts, pecans, and vegetables. All of the crops can be found in the cotton production area. Stink bugs are highly mobile, and they move from crop to crop.

Current research focuses on the movement of stinkbug populations and improved scouting/thresholds for cotton. Typically, damage in cotton is worst near field margins. It may be possible to focus control methods in those areas and reduce the amount of pesticide needed to manage stinkbug populations.

For more information, see http://apps.caes.uga.edu/impact/viewbrief.cfm?bid=2914 and http://apps.caes.uga.edu/impact/viewbrief.cfm?bid=2914.

Generating public support for IPM

We recently completed a multi-year project to increase public awareness and support for IPM and local Extension resources. With a grant from USDA, we assembled a box of IPM materials for public libraries. Each package included the following items.

1) Three posters supporting IPM (Home IPM, School IPM, Ag IPM). The posters also directed patrons to their local Extension office and Internet resources.
2) A series of bulletins (English and Spanish) about IPM techniques to manage common household pests.
3) IPM promotional items (flyswatters and refrigerator magnets) directing users to IPM information on the Internet.
4) Response cards for library patrons.

We delivered the packages to more than 200 public libraries across Georgia. These libraries serve about 40% of the state's population. More than 90% of the patrons

responding indicated that the project generated support for IPM around the home, in schools, and in agriculture.

Libraries were very receptive to this type of project. It could be a valuable avenue to distribute information.

For more information, contact Paul Guillebeau bugman@uga.edu.

Peaches

In the Southeast, peach tree borers are a serious pest. Uncontrolled populations kill peach trees. Current management programs depend on applications of chlorpyrifos. However, laboratory research indicates that entomophagous nematodes may be able to control peach tree borers under certain conditions. With appropriate irrigation techniques, nematodes may be useful for managing peach tree borer in the orchard. Although this idea has potential, significant research must be done to investigate the feasibility of this approach.

For more information, contact Paul Guillebeau bugman@uga.edu.

Pecans

Aphids are a serious pest of pecan in Georgia. Historically, aphid management focused on foliar applications of insecticides. Establishment of multicolored lady beetle populations has greatly reduced populations of aphids attacking pecans. However, the beetles often choose homes as overwintering sites. In some cases, thousands of beetles enter homes. In this situation, the solution for one problem created an unforeseen problem.

Pecan research has been focused on reducing inputs of fertilizer and miticides. Intercropping with legumes reduced nitrogen inputs and provided habitat for beneficial arthropods. Selective miticides helped to preserve populations of predatory mites, but the new miticides cost 4-5 times more than older miticides. Further research will determine if the new techniques are cost-effective for pecan growers.

For more information, see http://apps.caes.uga.edu/impact/viewbrief.cfm?bid=1816

SERA-IEG – 3 2007 Annual Report for Kentucky

Doug Johnson and Patty Lucas

PROGRAM MANAGEMENT: The Kentucky Integrated Pest Management program (UK-IPM) has been in place since before 1980. We are unsure when Smith/Lever 3(d) funding (S/L3(d)) began, but IPM demonstration projects began in ca. 1976. The total S/L 3(d) funding is just slightly over $100,000. Under the current dean and the two previous deans, at least since 1989, 100% of these funds have been administered by the UK-IPM coordinator. No other funds of any sort, federal / state / county / local, are dedicated to the UK-IPM program. However, past and current working groups, as groups and as individuals within groups, have been successful at securing competitive funding for numerous projects.

The first coordinator Dr. Harley Raney (deceased) served through 1988. We are unsure of the funding status / appointment split of the first coordinator, except that he did have an appointment as an extension entomologist. The current coordinator has served since that time. At least since 1989 the S/L 3(d) funds are not used in support of the coordinators compensation package. Additionally, the coordinator has a 100% extension appointment in Entomology. There is no administrative appointment for the coordinator.

Since 1990, Ms. Patty Lucas has served the program as a 100% extension specialist for IPM. Ms. Lucas's compensation package is supported using S/L 3(d) funds. There is no administrative appointment for this position. In recent years Ms. Lucas has been successful in obtaining grant funding for various projects which contain salary support. Though this varies from year to year, this grant based salary support allows for using the corresponding S/L 3(d) funds in direct support of IPM programs. Ms. Lucas also serves as the Kentucky "State Contact" for the SRIPMC.

PROGRAM DELIVERY: Kentucky continues to operate a diversified IPM program. UK-IPM currently supports statewide working groups in corn/soybean, wheat science, commercial production of ornamental plants, pest diagnostics, and vegetable IPM. UK-IPM also supports individual and multiple county programs through a mini-grants program. Additionally, UK-IPM provides to 13 Extension / Research specialists subscriptions to "CDMS" pesticide label service and a large audience accesses to the "Plant Management Network."

As working groups and individuals UK-IPM collaborates with a large array of other programs. Examples include but are not limited to, Pesticide Safety Education (PSA), IR-4, and Cooperative Agricultural Pests Survey (CAPS) programs. In addition we work directly with the KY state pesticide "lead agency", KY Dept. of AG, Division of Environmental Services.

Over the years, UK-IPM working groups and individuals have received several awards. Two working group have received external awards in the past year. Corn/Soybean group received a project award form the Agronomy Society. Wheat Science group received the

Integration Award from USDA, and Friends of SRIPM Center "Pulling Together" award from Southern Region IPM Center.

ACCOMPLISHEMNTS RELATED TO SERA OVER THE PREVIOUS YEAR

Information from our discussion of "Human Subjects"(2007 SERA, San Antonio, TX) lead to the IPM coordinator obtaining "required training" in the area of "Human Research Subjects". The UK-IPM Specialist, Ms. Patty Lucas was previously qualified. Together this allows us to submit for approval to the Internal Review Board (IRB) our plans for gathering program review information. We have gained permission to solicit information using both paper and web based survey tools. We feel that this enhances our grant proposals.

UK-IPM serves a major support of the Soybean Rust working group. All of their initial communication devices (list serves) were set up and maintained by UK-IPM specialists Ms. Patty Lucas.

UK-IPM participates in the regional aphid suction trap network, combining funding from UK-IPM and the KY Soybean Growers and Kentucky Small Grain growers Associations, to support traps in KY and graduate student / technical support for those identifying, sorting and counting the aphids. Until just recently, the KY traps were the most southerly traps in the network. That distinction is now held by U. MO, Delta Center at Portageville, MO.

UK-IPM also supports and participates in the Soybean Rust/Aphid PIPE, operating sentinel plots, diagnostic services, and expert commentary. Dr. Don Hershman (Plant Pathology) is a national leader in this effort. Recommendations from this team have undoubtedly avoided millions of dollars in inappropriately applied pesticides. Although, without the same urgency, keeping producers and consultants involved in and abreast of knowledge concerning soybean aphid has prevented unneeded applications against this pest.

Louisiana

Activities:

Field days highlighted research and extension plots that demonstrate some aspect of pest management. Total attendance for statewide field day programs exceeded 4000. Other activities included commodity grower meetings (3000 attendees), agent training sessions (100 attendees), consultant training (275 attendees), field disease (especially soybean rust) identification training (80 attendees). All three of the major IPM disciplines were included in each activity program.

Outcomes:

The overall result of the training activities, regardless of type, is the increased knowledge of the scouting methods, better pest identification, and increased knowledge of the epidemiology and method of management.

Dissemination activities:

Other than the oral presentations mentioned above, there was the increase of activity on the IPM*Louisiana* website, and the introduction of a new series of publications on horticultural plant diseases, *Louisiana Plant Pathology: Disease Management and Identification Series.*

Future Initiatives:

The initiatives include: expanding the IPM*Louisiana* website and expanding the *Disease Management and Identification Series* to agronomic crops. A rice disease publication is in the last stages of development with the target audience being Extension agents and agricultural consultants. The Soybean Atlas is being revised and a pocket guide to properly identify soybean growth stages and diseases is being developed after an unexpected delay.

Impacts:

Realizing this is a general statement, but the overall impact of efforts by the pest management faculty, as measured by pre- and post-tests, shows an overall average of pre-test scores at 86% rising to a post-test score of 93% of measured participants in IPM programs.

Publications:

See section “Future Initiatives” above.

SERA-IEG3 2007 Annual Report For Mississippi

Clarence H. Collison

Cotton IPM- Since the introduction of transgenic B.t. cotton in Mississippi growers have dramatically reduced sprays for the budworm/bollworm complex in cotton. However, coupled with reduced sprays with the success of the boll weevil eradication program, we have seen an increase in secondary and occasional pests in cotton. The sucking bug complex (particularly tarnished plant bug) has quickly filled the void left by tobacco budworm and boll weevil. Also, two-spotted spider mites have increased in status from occasional pest to ranking as Mississippi's # 3 pest in 2006 and 2007 in total bales lost. The 2007 growing season also saw record numbers of tarnished plant bug applications in the delta region of the state. Producers in the delta averaged 7.5 applications for tarnished plant bugs compared to the previous high set in 2004 with average number of applications for tarnished plant bugs reaching 5.2 applications.

Researchers and Extension personnel from Mississippi and other mid-south states have teamed up over the last several years to address these problems. Recently we have completed work comparing sampling methods for tarnished plant bugs in flowering cotton (published in JEE, December 2007). Currently we have ongoing projects to refine thresholds for tarnished plant bugs in the mid-south. Also, in Mississippi we are working to implement a cotton verification program in 2009. The goal of this project is to help demonstrate IPM principals to producers in hopes of reducing the number of insecticide applications producers are currently making to control tarnished plant bugs. Some of the components of the project will be to utilize hosts plant manipulation in early spring, reduce edge effects with corn and other crop hosts for tarnished plant bugs by trying to get producers to grow cotton in more continuous blocks instead of small patch work areas, demonstrate the benefits of nectariless cotton varieties, demonstrate differences in early verses late season maturing cottons with respect to late season pests pressure, work with growers on chemistry rotation, and demonstrate the importance of correct nozzle selection. These are some of many more sustainable practices the cotton IPM program is addressing in Mississippi in hopes of reducing insecticide sprays on cotton.

Greenhouse Tomato IPM- There are approximately 18 acres of greenhouse tomatoes currently being produced in Mississippi with about 125 individuals employed by the 6.5 million dollar industry. Insect pests and diseases caused by fungi and viruses are the main deterrents to production, and are common in most greenhouse operations. Tomato spotted wilt virus is still the most devastating viral disease of Mississippi greenhouse-grown tomatoes. One operation experienced a total loss of the crop due to the disease. Adoption of IPM practices is becoming more prevalent due to increased research on "soft" chemistry products that are safer to the environment and to the grower. In the one case of the total crop loss, the growers were not using any pesticides in their production system. Adoption of OMRI approved insecticides allowed for excellent insect control, and thus virus elimination, resulting in above average yield. These types if instances are becoming more common as growers become educated and aware of the existence of these

new tools for insect and disease management. Development of a pictorial website for the identification of the more common greenhouse tomato diseases is now available for growers to access which will greatly improve accurate diagnosis and subsequent recommendation of appropriate IPM procedures for their management. Visit http://msucares.com/crops/comhort/tomatodisease/index.html for a description of symptoms based on plant part and diseases associated with those symptoms.

Sweet Potato IPM- Results of three of four years of research to identify factors of sweet potato production associated with insects, weeds and cultural practices in Mississippi are reported. Commercial sweet potato growers cooperated in the project by providing large plots of sweet potatoes with the following insecticide scenarios: no insecticide and pre-plant incorporated (PPI) insecticide plus foliarly applied insecticide during the season. During the last two years, some growers have also provided plots with pre-plant incorporated insecticide only, and plots restricted only to foliarly applied insecticide during the season (these data are still being analyzed). Additionally, plots in commercial fields were designed to evaluate the effect of weeds on sweet potato yield and the relation of weeds to insect populations and insect damaged potatoes. Potatoes from these plots were evaluated for insect damage that was then associated with insects sampled from each plot during the season. Results include the listing of insect species associated with sweet potatoes and the determination of primary insect pests, their likely population trends during he summer, and evaluation of insect damage. Cultural factors including date of preplant-incorporated insecticide application, planting date and harvest date, were evaluated in relation to damage by primary insect pests. The relationship of weed species and weed density to sweet potato yield and insect damage is briefly discussed, and additional information will be available after data analysis is complete. Some 15 packing lines were evaluated for potential potato-damaging drops by use of the 'smart spud', an electronic potato that recorded impacts that occur on packing lines.

A very concise summary of findings is presented below for the Mississippi portion of the Southern Sweet Potato IPM project.

- Early season insects were: Corn leaf beetle, click beetle (wireworm) adults and flea beetles.
- Mid season insects: White fringed beetles, *Phyllophaga* (white grub adults)
- Late season insects: Flea beetles in general, sugarcane beetles, whitefringed beetles. (*Systena* flea beetles have about the same population all summer)
- Correlation data indicate that a threshold for triggering insecticide applications to control *Systena* flea beetles and sweet potato flea beetles may be possible.
- Numbers of 12-spotted cucumber beetle did not correlate with damage associated with that species indicating that the pest status of that insect requires additional research.
- Good sampling methods for flea and leaf beetles include sweep-net and sticky cards. Vacuum is good if properly used, but they clog easily with leaves and require a diligent sampler to do it right.
- Rotation crops preceding sweet potatoes ranked in order of most to least damage in sweet potatoes are: Soybeans, Pasture, Cotton, Sweet Potato, and Corn.

- PPI - The shorter the interval between PPI insecticide application and planting the better.
- PPI insecticide plus foliar applications of insecticide reduces damage from wireworms, and reduces early season damage from whitefringed beetle, sugarcane beetle and white grub. However, that does not take into account the odd field with overwhelming numbers of wireworms etc.
- Capture (bifenthrin) is good as PPI material, however lay-by application of Capture has not been consistently efficacious in Mississippi.
- Regent (Fipronil). We are corresponding with authorities but chances of getting this material is slight.
- Planting date - In general, the later the planting the more damage will be incurred by cucumber beetles, white fringed beetles and white grubs. Planting date did not affect flea beetle damage.

February 27, 2008

Oklahoma IPM Program Overview

The Oklahoma IPM Program maintains a tradition of conducting highly interdisciplinary IPM programs through 13 IPM/ICM teams (alfalfa, cotton, greenhouse/nursery, tree fruit and nuts, vegetable, wheat, stored products, sorghum, soybean, peanuts, urban, school, weed). More information is available on the Web at http://www.ento.okstate.edu/ipm/index.html.

In 2006, a collaborative program called the Team Initiative Programs (TIP's) was begun through a cooperative effort between the Oklahoma Agricultural Experiment Station and the Oklahoma Cooperative Extension Service with the goal of encouraging and financially supporting the development of new research/extension projects that can support the development of proposals for competitive grant funding, or initiate projects that can provide direct impact to the intended stakeholders on a short-term basis. In 2007, the IPM TIPS Team reviewed our priorities and changed them so that they are in alignment with the Southern Region IPM Center priorities, including:

Research:

1. Vector/virus management of crops
2. IPM at home-inside / outside (landscape, community
3. Development of decision aids for management of pests for all crops.

Extension:

1. Develop interactive web-based educational resources for county Extension Educators,
2. Deploy multi-disciplinary regional IPM programs to Oklahoma crops.
3. Develop usable tools to measure adoption/impact of IPM
4. Develop future IPM professionals, including university students.
5. Develop home/landscape IPM resources in Spanish/English.

In 2006, the IPM program agreed to help support the following projects ($ from IPM):

- Enhancement of Horticultural Extension educational programs to foster IPM by Oklahoma grape and pecan producers ($2500)
- Educational Manual and program for controlling woody plants ($8000)
- Comparison and demonstration of IPM benefits realized through multi-species grazing of native rangelands ($6495)

In 2007, the IPM program agreed to help support the following projects ($ from IPM):

- Development of an integrated approach for managing black rot in grape ($10,000)
- Web-based portal for turf grass management ($6,000)
- Design and validate weather and forecast decision support tool to reduce pesticide drift through the Oklahoma Mesonet ($3800)

In 2007, I initiated a program to help support graduate student stipends for projects directly related to IPM. A portion of the federally allocated IPM funds a used to fund a 1:1 match for up to 2 graduate research stipends with any department in the Division of

Agricultural Sciences and Natural Resources that has a project directly related to IPM. The IPM program is currently supporting one student in the Department of Horticulture and Landscape Architecture who is working on an insect management project with the growing wine/table grape industry in Oklahoma. The IPM program also agreed to support with a 1:1 match with the Cooperative Fisheries and Wildlife Unit, a student to work on the biological control of salt cedar in the Great Salt Plains Wildlife Refuge (2007-2009).

Urban

- School IPM – OSU (IPM and Pesticide Education) remains a partner in the Southwest Technical Resource Center for School and Childcare IPM, along with TAMU and NMSU (http://schoolipm.tamu.edu). The IPM program received an additional grant of $52,000.00 from the Environmental Protection Agency to fund 6 demonstration IPM Schools, including one Native American school. This project will run through 2008 and provide support for a Master of Science graduate student who will develop educational materials that will be provided to all county extension offices. This material will be designed to support any school in Oklahoma who wants to initiate a voluntary School IPM Program. Ms. Carmen Russell was hired in August of 2007 to supervise the project. She has attended two meetings Results of a previous EPA grant at two demonstration schools showed that the implementation of non-chemical preventative strategies reduced mouse infestations by 95% and reduced brown recluse populations by over 90%.

Crops

- Wheat IPM –The Areawide Pest Management for Cereal Aphids in Wheat project is in its final year, it is a cooperative effort among 6 states (OK, TX, CO, WY, NE, and KS); more information is available at http://www.pswcrl.ars.usda.gov/awpm.htm. This year, the program has made a major thrust to develop a comprehensive outreach program that includes a DVD program that highlights the impacts that the program has had over its existence and the development of a multi-state Wheat Production Manual.

  A new grant from the Pest Management Alternatives Program for approximately $172,000.00 was obtained to validate and expand the implementation of the "Glance 'n Go" sampling method to Kansas and Texas for greenbugs in winter wheat. It will measure changes in producer knowledge and adoption of Glance 'n Go, and evaluate the economics for use of the system. The Glance 'n Go system is the first of its kind to incorporate natural enemies into a treatment threshold and presence/absence sampling system for any agronomic crop in the United States.

- Cotton - Cotton was grown on 164,481 acres in 2007. Transgenic cottons are being widely adopted. The newsletter Cotton Outlook, sponsored by the Cotton IPM program, is still being published, and we just hired an area Entomologist with cotton responsibilities to replace the position formerly held by Dr. Miles Karner, who passed away in 2006. The Oklahoma Boll Weevil Eradication Program is in its 10^{th} year.

The number of acres treated has steadily declined since the inception of the eradication program, from 1.4 million acres (sprayed 10.2 times per year) in 1998 to 193 acres (sprayed 0.048 times per year) in 2007. More information can be obtained from the organization's Web site at http://www.obweo.org. Lint yields have increased from 573 lbs lint per acre in 2000 to 890 lbs lint per acre in 2007.

- Fruits/Nuts - Pecan IPM The Pecan Management Course continue to be very popular, each reaching more than 90 growers.

- Grape and– The grape/wine industry is a fairly new enterprise for Oklahoma, and thus an emergent area for Extension education in IPM. The Grape Management course continues to be very popular, each reaching more than 60. While small in number, this program, along with the Pecan IPM Management Course reach more than 80% of the acres managed for each of these crops. One of the main modules for this training involves insect, weed and disease management. A graduate student is being supported in part through IPM funds from 2007-2009 to evaluate and develop strategies for the green June beetle, a pest of cultivated grapes in Oklahoma.

- Weed Management -Musk thistle (*Carduus nutans* L) was introduced into the eastern seaboard area of the US around 1853. Since its introduction, it has become a weed of considerable economic importance, especially in pasturelands. It reduces forage yields and forage quality by competing with the desirable forage plants for water, soil nutrients, and light. Musk thistle was first identified in Oklahoma in 1944, and is currently found in more than 62 counties. Infestations of musk thistle in improved pastures cause significant economic losses in Oklahoma. In 1998, Oklahoma legislators passed a law designating musk thistle, along with scotch and Canada thistles, as noxious weeds in all counties of the state. Based on a 1995 pasture survey, average acreage of improved pasture for each producer in Oklahoma ranged from 40 to 160, depending on location in the state. The average cost of controlling musk thistles for 10 years using herbicides would be $5,200 per producer. We estimated that there are about 7.1 million acres of improved pastures in Oklahoma, so the cost of controlling musk thistle with herbicides for 10 years, if all improved pastures were infested, would be $461,500,000.

  An Oklahoma IPM musk thistle control program was developed in the early 1990s and has been implemented statewide through cooperative efforts of researchers, Extension personnel, and landowners. It focuses on increasing public awareness of the problem, development of educational information, demonstrating various control options, and introducing new biological control agents. Two demonstration and educational meetings were conducted in 2007 to landowners and NRCS employees. Extension educators and landowners collected approximately 40,600 musk thistle head weevils in Alfalfa and Grant, and Garfield Counties in the spring of 2007 and released by 38 cooperators.

  To date, this program collected and redistributed more than 800,000 musk thistle head weevils and 28,910 musk thistle rosette weevils across the state. Landowners in NE

Oklahoma have noted from 80% to 95 % decrease in number of musk thistle plants in areas where they are using an integrated approach that includes use of the musk thistle weevils. If the typical landowner applies 1 lb active ingredient of herbicides per acre annually, biological control has decreased the amount of herbicides applied to the environment by 7.1 million lbs per year.

- The IPM program recently partnered with the Cooperative Fisheries and Wildlife service to begin conducting research aimed at introducing *Diarhabda elongata* for control of salt cedar in the Great Salt Plains Wildlife Refuge in Oklahoma. Ms. Alissa Berro was recruited as a graduate research assistant to conduct the research. Through the IPM program. If beetles become established through this project, we will develop a collection and redistribution program similar to that with musk thistle.

SERA-IEG3 2007 ANNUAL REPORT FOR PUERTO RICO

Wanda Almodóvar

PROGRAM MANAGEMENT: The PR IPM Program has been in place since 1979. The actual IPM Coordinator has been in place since 2000 with 20% of his time dedicated to the program. The IPM Specialist (20%) has been in place since 2006. Total annual 3(d) funding is about $50,000. The IPM Coordinator has control of the 3(d) funds and less than 50% of the funds are used for salaries. Additional funding was obtained to complement the program: "Urban Tree IPM" (Forest Service), "Survey of Forest Pests and Early Detection of Exotic Pests" (Forest Service), Develoment of IPM Guides for Coffee, Citrus, Plantain and Banana, (SRIPM, Enhancement Grants; "Landscape IPM," PESP - EPA; "IPM for Black Sigatoka, Mycosphaerella fijiensis in Puerto Rico," SRIPMC, Enhancement Grants.

The PR IPM management structure put emphasis in educational materials, like IPM guides, manuals, fact sheets, posters and newsletters. Another area important area of emphasis is placed in the content of the websites of the Extension Crop Protection Specialists (http://academic.uprm.edu/walmodovar, http://academic.uprm.edu/ofarrill, http://academic.uprm.edu/aalvarado. IPM information generated by each specialist is posted and updated in a monthly basis. The education and training program is part of the Cooperative Extension training program, and collaboration is very active with the Department of Agriculture, the Forest Service through IITF and the Department of Natural and Environmental Resources. Planning and priority setting were accomplished by the participation of the IPM Coordinator and the IPM Specialist in the annual meetings for the commodities where growers, researchers, Extension agents and specialists discuss the situation of crops in terms of pests and diseases of importance and define management priorities for each commodity, identifying critical information needs, compiling IPM resources, and determining future projects.

PROGRAM DELIVERY The following publications were completed and placed on the websites of the Crop Protection Specialists: Integrated Management of Diseases in Forest Nurseries in Puerto Rico (Manual), IPM for Black Sigatoka and other diseases of Plantain and Banana (Manual), IPM for Black Sigatoka (IPM Guide), Hydroponic Tomato IPM, Cherry Pepper IPM, Black Sigatoka IPM, Poinsettia IPM (Power Point Presentations). Key Pests in Gardens: Identification and Integrated Management (manual and Power Point Presentation), Key Pests of Turf and Golf Fairways: Identification and Integrated Management (manual and Power Point Presentation) Key Pests of Urban Trees: Identification and Integrated Management (manual and Power Point Presentation), IPM guide for Plantain and Banana, IPM Guide for Citrus, IPM Guide for Coffee and a CD about IPM in Plantain, Banana, Citrus and Coffee.
A great amount of time was invested in plantain and banana and coffee IPM as a result of the presence of two new pests detected in these crops in recent years. Black Sigatoka was detected in 2004 and the Coffee Berry Borer (Hypothenemus hampeii) in August 2007. The benefits of IPM in PR were measured in terms of collaboration with state agencies and groups, publications, presentations, and education and training.

PROGRAM INVOLVEMENT: Collaboration with Cooperative Extension was good with participation at meetings throughout the Island. IPM personnel contributed to meetings of the

Horticultural Society, Puertorican Society of Agricultural Sciences, Forestry Conference and APS-Caribbean. An educational interdisciplinary project that included field evaluation of forest pests was established in cooperation with the Forest Service, IITF to train personnel of the Department of Natural and Environmental Resources in forest IPM. Cooperation improved with the USDA-APHIS Cooperative Agricultural Pest Survey (CAPS) program by a project to survey forest pests in State Forests using GPS technology.

ADMINISTRATIVE SUPPORT: The IPM Program in Puerto Rico received full support from the chairman of the Crop Protection Department and the administration of the UPR-College of Agricultural Sciences. Access to 3(d) funds was not difficult. Professional development opportunities involved participation in meetings in Puerto Rico, Costa Rica (Caribbean Food Crop Society) , Hawaii (Arboriculture Society), along with an intensive training in Coffee Berry Borer identification (USDA, Maryland (Smithonian Inst.).

South Carolina State Report
2007 SERA-IEG 3 Meeting

The Clemson University IPM Program (CUIPM) is a highly diverse and interdisciplinary effort involving the development of research-based information, which in turn is extended to the public through a variety of extension, education and outreach programs. The Program is driven by stakeholder needs, and stakeholders have an integral role in helping to establish priorities for the Program. The CUIPM Grants Program, a competitive grants program supported by Smith-Lever 3(d) funds, provides annual support for research and extension projects that are implemented to facilitate increased adoption of IPM practices in the state. A summary of each project along with project outcomes and impacts are available at http://www.clemson.edu/scg/ipm/funding.html. In 2006-2007 nine IPM research and extension projects were approved for funding with a total amount of $52,400. While the CU IPM Grants Program is an important component of the overall statewide IPM effort, many other IPM research and extension projects are conducted with support from state and extramural funding. Research and extension programs in IPM encompass a broad array of commodity and other focus areas, including field crops, tree and small fruit, vegetables, landscape and ornamentals, medicinal plants, honey bees, organic production and urban/structural pest management. The accompanying report provides an update on progress made in specific commodities and describes IPM success stories in areas where positive impacts have been documented.

Promoting IPM Strategies in Cole Crops

Overuse of broad spectrum pesticides in cole crop production has long been a problem. Although these crops have a number of significant insect pests, they can be controlled by insecticides having fewer non-target effects. Since these crops have considerable, widely-touted health benefits, their consumption has risen in the past decade resulting in increased production. Reducing pesticide load on these crops as well as reducing the overt toxicity of pesticides used on them would benefit the environment and also make the crops themselves more wholesome due to reduction in pesticide residues or inherent toxicity of any residue that may be present.

Research has been conducted over several years to evaluate methods to reduce pesticide usage in cole crops. We have developed an effective economic threshold and a sequential scouting scheme for caterpillar pests of collard. A number of field days, on-farm demonstrations and presentations at regional vegetable production meetings have shown growers how to use the scouting/threshold program and demonstrated its effectiveness. A pictorial guide to pests of cole crops and their natural enemies has been produced (Integrated Pest Management for Cabbage and Collard Growers: A Growers Guide EB 156 Clemson University). Additional outreach projects in 2006 further extended the information (and the guide) to small-scale limited resource farmers in the upper Pee Dee region (Marlboro County) and the lower sea islands (Beaufort County).

Our efforts in South Carolina have resulted in a functional economic threshold for caterpillar damage on collard (the major brassica crop produced in South Carolina, the second leading producer of collard in the US), and a proven effective scouting program for caterpillar pests on collard. The program education efforts began in Lexington County, which grows over 2000 acres of collard. Growers here have used this program successfully for several years. Testimonials from these growers and presentations by them at field days and demonstrations have resulted in adoption by growers in other counties.

Adoption of the collard IPM program by growers has effectively reduced caterpillar damage in cole crops while reducing the overall number of pesticide applications. Also, the program has promoted the use of insecticides with reduced impact on the environment and human health, and has resulted in a marked reduction in the use of broad-spectrum insecticides which can exacerbate problems with secondary pests such as aphids or thrips. Reduction in secondary pest damage has been documented in areas where the program has been adopted.

We have shown that the economic benefits from the program resulting from an overall reduction in pesticide use has been greater than any additional input costs associated with scouting, using alternative pesticides, enhancement of biological control, or using augmentative biological control. Although an actual direct cause-and-effect relationship cannot be shown, there has been a dramatic increase in acreage Lexington County and other collard-growing areas where the program has been adopted since the inception of this program. Growers and county extension agents from North Carolina and Georgia have requested information on the program and have indicated an interest in promoting and adopting the program in these states.

For More Information, Contact:
Dr. Powell Smith
Lexington County Extension
605 West Main Street, Suite 109
Lexington,SC 29072-2550
Phone: 803-359-8515 ext 0 Fax: 803-359-4245
JPSMTH@CLEMSON.EDU
Email: zehnder@clemson.edu

Development of an Effective Trapping System for Small Hive Beetle, an Introduced Pest of Honey Bees

The small hive beetle (SHB) is an introduced pest of honey bees and has now been found in Florida, Georgia, South Carolina, North Carolina, Pennsylvania, Ohio and Minnesota. SHB can be a destructive pest of honey bee colonies, causing damage to comb, stored honey and pollen. If a beetle infestation is sufficiently heavy, they may cause bees to abandon their hive. The beetles can also be a pest of stored combs, and honey (in the comb) awaiting extraction. Beetle larvae may tunnel through combs of honey, feeding and defecating, causing discoloration and fermentation of the honey.

Over the past several years Dr. Mike Hood has conducted field research with the goal to develop effective IPM tools for the US beekeeping industry. A primary focus as outlined in the state IPM Plan of Work is to develop safe, economical, and efficient alternative controls measures or methods for the SHB. Several years of research and field testing have resulted in the development of the Hood Small Hive Beetle Trap. The trap is a simple device that is attached to the bottom of the hive frame and filled with apple cider vinegar as an attractant. Beetles enter the trap and die. Testing in the field has demonstrated that the traps successfully capture and reduce SHB throughout the season when placed in newly established colonies.

Hood Small Hive Beetle Traps were first distributed in the spring of 2006 and are currently marketed by Brushy Mountain Bee Farm, Inc, Moravian Falls, North Carolina (www.brushymountainbeefarm.com). Over 3,000 traps have been sold to beekeepers throughout the US during 2006 by Brushy Mountain Bee Farm. Kelley Bee Supply www.kelleybees.com located in Clarkson, Kentucky is also currently marketing the trap. Traps have also been distributed to Australia for possible marketing in that country. The trap system will result in a significant reduction in pesticides applied for SHB control. As a result of this research beekeepers are now choosing non-chemical alternative control measures to manage SHB. Many beekeepers no longer apply insecticides for control of SHB and are using other non-chemical control measures which we are recommending including the Hood Small Hive Beetle Trap to manage this pest.

For More Information, Contact:

Dr. Mike Hood
Dept. of Entomology, Soils and Plant Science
114 Long Hall
Clemson University, Clemson, SC 29634
864-656-0346
Email: zehnder@clemson.edu

Management of brown rot in the southeastern United States

Brown rot disease caused by the fungal pathogen Monilinia fructicola is one of the most serious diseases of peach in the southern U.S. and is a limiting factor in peach production. To compound the problem M. fructicola has developed resistance to members of the demethylation inhibitor (DMI) fungicides, the most effective chemical class for brown rot control. Thus peach growers currently have limited options for control of the disease.

In a comprehensive survey of brown rot disease in South Carolina peach production areas we have located resistant populations, isolated specific strains of the pathogen, and studied their sensitivity to various fungicides and their fitness.

Growers have been advised to rotate between DMI and strobilurin fungicides for preharvest brown rot control. They have also been advised to not use these materials any more for blossom blight control. We estimate that this change in management strategy has prevented a loss of $10 million due to brown rot disease. We are also confident that with these new strategies, resistance will not develop as quickly in SC.

For More Information, Contact:

Dr. Guido Schnabel
B04 Long Hall, Box 340315
Clemson University, Clemson, SC 29634-0315
864-656-6705
Email: zehnder@clemson.edu

Reducing Pesticide Risk through Education: A Program to Incorporate IPM Concepts into Elementary School Curricula

The amount of pesticides used in residential settings has surpassed agricultural pesticide usage. Young children are at greatest risk from accidental pesticide exposure because of their inquisitive nature and physiological susceptibility. Children are receptive to information on IPM, and if they have basic knowledge of pests, pesticide safety and IPM they will be less likely to be unnecessarily or accidentally exposed to pesticides. Further, as adults they will be more likely to implement non-chemical pest management methods and less likely to make prophylactic applications of pesticides. Because IPM is based on pest identification, biology and ecology combined with the needs of society, IPM is an ideal subject matter topic for the classroom. An IPM activity can touch on many disciplines and can be adapted to many areas in pre-existing curriculum. Students easily relate to the subject of IPM because pests are relevant to everyone's daily life.

The overall goal of the project was to plan, develop, implement and evaluate a discovery-based learning curriculum for grades 4 and 5 to introduce students to the basic concepts of integrated pest management (IPM). A pilot curriculum project was conducted during the 2005/2006 school year for 4th and 5th grades at the A.R. Elementary School in Pickens, SC. The curriculum will serve as a model for adoption by other elementary schools. The approach was to adopt a main IPM theme that could be taught across disciplines (science, math, language arts, and social studies). Based on teacher input, IPM draft curricula were developed for 4th and 5th grade science, social studies and language arts classes. A 3-day teacher training session was organized and held at A.R. Lewis School and at Clemson University on July 25-27, 2005. The training was conducted by Clemson University urban IPM faculty and specialists. The purpose of the training was to give teachers a general overview of the concepts of IPM and reduced-risk pest control strategies, and also to introduce the curricula and to solicit input for any needed revision. Five teachers attended the training and provided comments on the curricula, which will be incorporated into the final IPM curricula for implementation. Teacher and student surveys were developed to evaluate the impact of the curricula on students, and to assess value to teachers.

Based on A.R. Lewis teacher input, the draft curricula were revised and customized IPM curricula were developed for 4th and 5th grade science, social studies and language arts classes. The two curricula were implemented at A.R. Lewis Elementary School during the 2005/2006 school year. Approximately 90 4th and 5th grade students participated. The curricula are available in PDF format at http://www.clemson.edu/scg/ipm/schoolipm_teachers.html.

Special school activities during the year related to the IPM curricula were also conducted. A "Bug Night" was organized at A.R. Lewis Elementary School on January 19, 2006. The event was attended by over 300 parents and children who participated in interactive and fun activities to familiarize them with insects and IPM. These included a "Fear Factor Café" which offered menu items made from insects, hands-on insect displays, and games and movies with insect themes. As a capstone project, students used GPS units to locate and map fire ant mounds around the campus and monitored the effectiveness of ant management strategies.

The five teachers who participated in the curriculum project indicated a unanimous high level of approval and support for the curriculum. They indicated that a key factor in the success of the curriculum was that the curriculum was specifically designed for grade 4-5 study areas and curriculum standards established for South Carolina. Thus, the curriculum provided "teacher and student friendly" tools to meet the curriculum standards, particularly the science curriculum standards which include: Characteristics of Organisms; Life Cycles; Organisms and their Environment; Habitats and Adaptations; Populations and Ecosystems; Organization and Classification of Living Things; Behavior; Availability of Food and Resources.

Student surveys were developed but students were not surveyed because of school administration concerns over privacy rights. However, teacher responses indicated that the curriculum was highly popular with students, and that students did gain competency with the concepts of IPM.

The curriculum is currently available for other schools to implement. We plan to meet with individuals from the South Carolina Department of Education and the South Carolina Math and Science Center to explore the feasibility of statewide implementation.

For More Information, Contact:

Dr. Geoff Zehnder
Dept. of Entomology, Soils and Plant Science
B28 Long Hall
Clemson University, Clemson, SC 29634-0315
864-656-6644
Email: zehnder@clemson.edu

Clemson University Urban Entomology Integrated Pest Management

Properly controlling termites in structures is complicated, prone to human or environmental mishaps and often costly to homeowners. The Clemson Urban Entomology Program in the Department of Entomology, Soils and Plant Sciences (ESPS) has a unique opportunity to train pest management professionals (PMPs) involved with termite control in the area of proper building inspection, structural calculations, treatment applications, and personal and environmental safety.

During 2006, in conjunction with the South Carolina Pest Control Association (SCPCA) and Clemson's Department of Pesticide Regulation (DPR), we offered four, two-day workshops for termite technicians. Two workshops, one in August and one in October, were designated the Apprentice Termite Techinican (ATT) Program and were designed for new termite control technicians. The other two workshops, one in September and one in November were designated the Master Termite Technician, and were designed for termite control technicians with several years of experience. These programs have been taught in previous years, but in 2006 the programs were enhanced to help increase compliance with state regulations for proper termite treatments by practicing PMPs, to improve environmental and safety awareness and to improve our evaluation of the impact of the programs.

The content of the classroom materials were modified to meet these goals, and additions and improvements were made to a mock building foundation for hands-on training. These improvements included adding simulated subfloor construction, additional structural piers, deck steps and a demonstration area for instruction on proper treatment of sub slab substrates. Total enrollment was limited to less than 100 registrants to maintain a proper class size for quality hands-on instruction. Training focused on aspects for proper inspection techniques, calculation and application of termiticides formulations, non-chemical control strategies and environmental and safety awareness. At the conclusion of the ATT and MTT programs, participants took written and practical tests based on the information presented. A grade of 70% or higher was considered passing.

For the August ATT program, 20 of the 21 participants passed with 70% or higher with a mean score of 83.3%. For the October ATT program, 20 of the 20 participants passed with 70% or higher with a mean score of 83.4%. For the more advanced September MTT program, 17 of 26 participants passed with a score of 70% or higher with a mean score of 75.6%. For the November

MTT program, 22 of 24 participants passed with a score of 70% or higher with a mean score of 74.8%.

Participants for the ATT and MTT programs were asked to complete an anonymous evaluation. Seven overall statements were presented on the evaluation using a Likert Scale of 1 to 5 with: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree and 5 = strongly agree. The following table summarizes the mean response for the ATT and MTT programs. The statements with average response scores for the two programs are provided below:

I am pleased that I participated in this program (4.8-4.9).

Overall, the presentations provided useful information (4.7- 4.8).

My knowledge of chemical control strategies for termites has increased (4.7-4.7).

My knowledge of non-chemical control strategies for termites has increased (4.5-4.5).

I expect to adopt new control practices as a result of attending this program (4.5-4.5).

My knowledge of safety for handling, delivering and applying termiticides has increased (4.7-4.6).

I am better prepared to comply with pesticide regulations

(4.8-4.7).

On the MTT evaluations, participants were also asked: “Did you participate in the Apprentice Termite Technician Program?” “If yes, did you adopt information you learned at the ATT program?” In 2006, 17 MTT participants reported attending the ATT program and 16 (94%) reported that they did adopt information they learned at the ATT program.

In 2007, two ATT and two MTT programs are planned. Program content will be evaluated and necessary changes or improvements will be made. For example, ESPS, DPR and the SCPCA are working together to design and ultimately add additional structural features to the training foundation to enhance hands-on instruction. The planned changes will not be inexpensive, and we’ll have the challenge of ultimately securing funding to make the desired improvements. However, the overall program content of the ATT and MTT programs is solid and is making a positive impact on pest control professionals in helping them comply with state regulations and improved IPM, environmental and safety awareness.

For More Information, Contact:

Dr. Eric Benson
Dept. of Entomology, Soils and Plant Sciences
105 Long Hall
Clemson University, Clemson, SC 29634-0315
(864) 656-7847 or 7860

Identifying Practical Knowledge and Solutions For Managing The Sucking-Bug Complex In Cotton

In a matter of a few years, the bollworm, Helicoverpa zea (Boddie), and tobacco budworm, Heliothis virescens (F.), complex will not be the number one group of insect pests in cotton. As we continue to move into an era of enhanced genetically-engineered cotton, the complex of hemipterans (sucking bugs) will become the most important insect problem requiring coordinated management efforts in the field. Cotton varieties with dual-protein protection from lepidopterans (caterpillars), afforded by genetic insertions from Bacillus thuringiensis (Bt) var. kurstaki, will be the only varieties available in a few years. They are particularly susceptible to attack from the sucking bug complex because these "second-generation" Bt cottons require no or few applications of broad-spectrum, foliar insecticides for lepidopterans. A removal of essentially all coincidental control or suppression of plant bugs and stink bugs will be achieved with removal of single gene Bt cotton varieties. When that happens, the tarnished plant bug (TPB), Lygus lineolaris (Palisot de Beauvois), will be the most important insect pest of cotton in the MidSouth, and species of predominant, phytophagous (plant-feeding) stink bugs, such as the green stink bug (GSB), Acrosternum hilare (Say), the southern green stink bug (SGSB), Nezara viridula (L.), and the brown stink bug (BSB), Euschistus servus (Say), will be the most important group of insect pests of cotton in the Southeast. Perennial infestations of the sucking bug complex result in considerable costs related to control and losses to yield and fiber quality. In the Southeast, economic thresholds for stink bugs have been researched and adopted but need to be verified and refined if possible. In recognition of the seriousness of this problem and to foster cooperation between scientists in the respective states, in 2005 Cotton Incorporated initiated funding a multi-year project entitled "Identifying Practical Knowledge and Solutions for Managing the Sucking-Bug Complex in Cotton: Research in the Southeast Region" through the Southeast Regional State Support Committee. Further refinement and validation of thresholds for the sucking bug complex in cotton are part of the research effort to address the problem and will provide information needed to maximize yields and preserve high fiber quality. Another subproject of this grant is gaining a better appreciation of how cotton plant phenology and various degrees of protection from bug damage impact cotton's susceptibility to the sucking bug complex as measured by yield and quality. A series of 14 studies, one in 2004, seven 2005, and six in 2006 were conducted in NC, SC and GA to better understand the nature of these relationships. In initial work presented in 2006 from NC and GA, evidence from 8 tests suggested that damage to quarter-sized bolls both early and late in the bloom could be raised with no loss in yield. Validation of these findings was continued in 2006 with studies conducted in South Carolina.

In 2006, we investigated treatment thresholds, insecticide application timing for stink bugs, and fiber quality issues in cotton in North Carolina, South Carolina, and Georgia. Results analyzed in 2006 from trials conducted in 2005 demonstrated that stink bugs clearly had a significant impact on yield and fiber quality. In order to address yield and quality effects of sucking bugs, a total of 79 sub-optimum treatments were compared versus aggressively sprayed treatments in 24 trials. Yield loss associated with bug damage ranged from none to major loss of lint. Percent lint turnout tended to decrease in treatments as yield loss increased. In treatments where yield losses exceeded 500 lb lint per acre the percent lint was 1.7354% less than the aggressively sprayed treatments. There was a tendency for micronaire, upper half mean, and length uniformity index to decrease as yield loss increased. Reflectance (Rd) tended to decrease and yellowness (+b) tended to increase as stink bug damage or yield loss increased. Neps tended to be larger and neps per gram tended to increase as stink bug losses increased. AFIS measures associated with length were negatively impacted as stink bug yield losses increased. Mean length by weight and number, upper quartile length by weight, and length of the longest five percent of fibers by number tended to decrease as yield loss increased. The coefficient of variation by weight and by number and short fiber content by weight and number increased as yield loss increased. Dust counts also tended to increase as yield loss increased.

Of the 24 trials summarized, eleven had three common treatments. Means for the aggressively sprayed treatment were significantly different than the untreated for all fiber quality measures with the exception of strength in the HVI analysis and trash size and seed coat nep size in the AFIS analysis. Means for the 20 percent internal damage threshold treatment were significantly different compared with the untreated except for the above mentioned variables and also elongation, area percent, fine, and maturity ratio. All fiber quality variables were statistically similar when comparing the aggressively sprayed with the 20 percent internal boll damage threshold with the exception of elongation. However, there was a tendency for the threshold values to be of slightly reduced quality for most fiber quality measures.

In 2004, 2005 and 2006, a series of 14 total replicated “progressive spray” tests was conducted in NC, SC and GA. The purpose these small plot tests was to obtain information about the relationship between a range of spray protection levels for sucking bugs (primarily stink bugs), and its influence on boll damage, cotton yields and fiber quality. To minimize the possible confounding effect of caterpillar damage, all tests were planted to a Bollgard II cotton variety. Each test consisted of 6 to 12 rows by 50 to 100 ft with four replicates, with initial sprays beginning just after at anthesis. This “most protected” treatment was sprayed weekly until the season’s end, and most often received seven applications of of Bidrin 8E @ 0.5 lb. ai/acre plus the highest rate of a pyrethroid. The next treatment was started one week later and protected for the remainder of the season, the third a week later, and so on. In most tests, weekly data were taken on square retention, percentage of dirty blooms, ground cloth sampling for all bug species and stages, internal damage to quarter-sized bolls, damage to bolls just prior to harvest, various measurements of boll diameters, yield and quality. In NC, green stink bug and brown stink bug predominated, with greens more common; in SC, green stink bug and southern green stink bug were present in approximately equal numbers with fewer brown stink bugs; in GA, southern green stink bug was the dominant species with some brown stink bug. Tarnished plant bug added only minimally to the boll damage at most sites. The relationship between quarter-sized boll damage and yield was extremely variable between tests, varying from a low of -0.6 lb. lint per 1% seasonal quarter-sized boll damage (higher yield loss in the weekly sprayed treatment was less than in the unsprayed treatment) in the 2006 Scotland County, NC site to a high of 14 lb. of lint per 1% seasonal quarter-sized damage in Tift County, GA in 2005. Protection from bug damage during the first 2 weeks of blooming appeared to have little impact on yields, while protection between weeks three, four, and five showed a major positive impact on yield. These findings suggest that high internal boll damage thresholds could be used both early and later in the season while more protective spray thresholds were used during the “critical fruiting period”, thus avoiding unneeded sprays.

Preliminary data gathered in Georgia during 1998-2001 demonstrated that the technique of using symptoms of feeding injury to bolls could be used as an indirect sample of stink bug density. It was established that signs of feeding damage in bolls could be used as a monitoring tool to trigger insecticide application for stink bugs in cotton. Static treatment thresholds were established in most cotton-growing states because of this previous research. During 2006, multiple tests in the southeastern USA were established for research addressing refinement of treatment thresholds and other timings of insecticide application for stink bugs in cotton. In general, populations of stink bugs were relatively low during 2006. In North Carolina there was an economic disadvantage to insecticide applications for bugs at the sites used in 2006. In South Carolina there were no significant differences in yield among the treatments tested at four out of six trials in 2006. In two of those four trials, season-long protection from early populations of tarnished plant bugs did not result in positive net returns, indicating that TPB were unimportant early in South Carolina during 2006. At the two sites with yield differences, the highest yields and net returns resulted when insecticide was applied during the 3rd, 5th, and 7th week of bloom using scheduled applications and when insecticide was applied using a dynamic threshold during the 3rd, 4th, and 5th week of bloom. The 10% component of the variable threshold was the only level reached using the dynamic threshold. Combined data for South Carolina indicated that a

variable threshold treatment resulted in the highest yield and net return. In Georgia there were no significant differences in yield among treatments tested at four out of five trials during 2006. At the fifth site, highest yields and net returns were observed in plots treated four times (weekly) or those treated one time at 10% internal boll injury in both static and dynamic thresholds. Combined data for all trials in Georgia with common treatments indicated that the dynamic/variable threshold produced the highest net return. Yield data from all tests with common treatments addressing thresholds based on internal boll injury and automatic applications for stink bugs were pooled for analyses. On average, 1.9 insecticide applications at the dynamic threshold resulted in an 85-lb increase in lint yield when compared with untreated plots and the highest net return (+$38.25) per acre.

Results of first-year studies conducted in a manner consistent with commercial production and ginning practices support previous work indicating that stink bugs negatively impact cotton fiber quality and that current insecticide threshold recommendations are in need of refinement. Samples of seedcotton from various trials in 2006 will be ginned at the UGA MicroGin and submitted to Cotton Incorporated for HVI and AFIS fiber quality analysis. Funding and support for this research provided by Cotton Incorporated and the Southeastern State Support Committees recognizes the seriousness of the sucking bug problem in cotton production. The impacts of this research to develop more effective pest management guidelines and insecticide treatment thresholds will improve the cost/benefit ratio for producers and decrease human health and environmental risks associated with pest management activities through avoidance of unnessary pesticide applications.

For More Information, Contact:

Dr. Jeremy Greene
Edisto Research & Education Center
64 Research Rd.
Blackville, SC 29817
(803) 284-3343 ext 245

Alternative Management Practices for Armillaria Root Rot on Peach

Introduction:

The soilborne disease Armillaria root rot is endemic to the southeastern United States and is the number one killer of peach trees. Virtually every grower is impacted and some have gone out of business because tree loss is too significant. Growers currently have no tools to control this disease. Research at Clemson University will establish a first set of IPM-based strategies to manage this disease and will therefore significantly contribute to the sustainability of peach production in the Southeast. The integrated management strategies under evaluation include novel cultural, biological, and chemical management options, as well as the generation of transgenic rootstocks.

Status of Activities:

Two field experiments were established to investigate root collar excavations for Armillaria root rot (ARR) control. For both experiments orchards with high ARR disease pressure were selected. One year old trees (bare rooted) were planted in the same locations were trees had declined from ARR disease. Evaluation of targeted chemical application. The efficacies of nine fungicides from six chemical classes were evaluated in vitro against two Armillaria tabescens isolates to select an effective fungicide for injection experiments. Propiconazole was the strongest inhibitor with EC50 values ranging from 0.49-0.86 mg/L. Both pressurized injection and non-pressurized infusion systems were tested on peach, but only the non-pressurized infusion system was suitable for chemical delivery. It was used to apply formulated propiconazole in three seasonal application timings. Distribution of propiconazole two days post infusion is being determined by GC-MS analysis. Evaluation of biological control. We are evaluating Trichoderma spp, fungi known to attack, parasitize and otherwise gain nutrition from other fungi. Trichoderma harzianum and T.

viride will be used in a formulation called Remedier™ to compete for nutrition, space and to directly kill the ARR pathogen. We are in the process of setting up two long-term field trials in ARR infested replant orchards to investigate Remedier™ for ARR control. We are currently working with the manufacturer and the USDA to obtain a shipping permit for Remedier™. Experimental trees were planted in March, 2007 two locations (sandy and clay soil) where ARR had killed trees previously. The Trichoderma formulations will be applied at planting and two times a year thereafter (in the fall and in the spring) by amending the soil with formulated product. Development of transgenic resistant rootstocks. Previously we have demonstrated that GAFP-1 transgenic tobacco and plum plants express and produce gastrodianin under the control of the 35S promoter. To study the potential of GAFP-1 as a resistance determinant in agricultural systems, we challenged the transgenic tobacco lines with several root disease pathogens from several higher-order eukaryotic lineages, including Rhizoctonia solani (Fungi), Phytophthora nicotianae (Straminipila), and Meloidogyne incognita (Metazoa). When challenged by R. solani and P. nicotianae, GAFP-1-expressing tobacco lines had reduced symptom development and improved plant vigor compared to non-transformed and empty vector control lines. These lines also exhibited reduced root galling when challenged by M. incognita. With promising data for the transgenic tobacco model system and a sufficient plum propagation system in place, we are shifting our attention to the GAFP-1 transgenic plum system. Initiatives are underway to evaluate potential disease resistance and socioenvironmental concerns regarding the use of GAFP-1 transgenic plum as rootstocks.
:
We are cooperating with Dr. Ralph Scorza with USDA-ARS in Kearneysville. He has been working to transform Guardian rootstock with our GAFP gene, and he is also interested in testing a more potent, root specific promoter for GAFP. Another new partnership includes our collaboration with Dr. Brian Dominy from the Clemson University Chemistry department. He is assisting us with procedures to make GAFP bind more effeciently to mannose.
Progress toward planned changes in pest management behavior:
Our research has indicated that planting new trees on a 12” burm will reduce ARR by reducing excess soil moisture. In addition, research has shown that excavation of the root collar can reduce the severity of ARR. Upon our recommendations, growers have begun to plant their new trees on a 12” burm. We will continue to evaluate the effectiveness of these procedures in commercial orchards.

Challenges to achievement of desired impacts:
Conventional peach growers are reluctant to adopt alternative IPM practices unless it has been demonstrated that the methods can be easily incorporated into the existing production system and also that they are cost-effective.

For More Information, Contact:
Dr. Guido Schnabel
B04 Long Hall, Box 340315
Clemson University, Clemson, SC 29634-0315
864-656-6705

2007 University of Tennessee IPM report
SERA003 Annual Meeting, St. Croix, US Virgin Islands, March 2008

Pat Parkman
IPM Coordinator, University of Tennessee Institute of Agriculture
jparkman@utk.edu

Activities of SL3(d)–funded programs

Cotton, Corn and Soybeans

The IPM Newsletter (28 issues) was sent directly, by e-mail or regular mail, to approximately 350 people on a weekly basis during the growing season. Parts, or all, of the newsletter were recycled weekly through county extension offices to about 1,400 additional individuals or agricultural business representatives. The newsletter can be accessed on-line at www.utcrops.com or via links from several other institutional web sites. Looking South Communications (agfax.com), an electronic ag periodical, indicated that the Tennessee IPM Newsletter is the number one crop newsletter downloaded from their website in 2007 (over 20,000 pages were downloaded in total). In 2007, 24 County Extension Ag Agents from the primary production counties were asked to evaluate the value of the IPM Newsletter to their Extension program and clientele. All 16 respondents indicated the newsletter was of "high" value (vs. "moderate", "some" or "low" value).

Considerable effort continues to maintain and further develop a UT website for field crops (**www.utcrops.com**), including the development and publication of several new web-based publications on soybean and corn IPM. The web site is also used as a data warehouse for insecticide trials done throughout the Midsouth.

There has been a continued increase in the utilization of UT Extension expertise by growers and other agricultural professionals. This is evidenced by the number of (and attendance at) training and grower meetings. The total value of IPM in cotton is estimated at a value of over 40-50 million dollars annually in Tennessee. As evidence of impact, the results of a grower survey at the 2007 Cotton Focus meeting (total attendees were ≈ 350, total respondents ≈ 35 representing about 100,000 cotton acres) indicated that 78% of producers changed their IPM practices based on UT information. Based on grower responses, the estimated value of all UT Extension programs was estimated at $18 million dollars per acre (note: 2007 survey of 2006 impact).

From the UT Extension reporting system SUPER (System for University Planning Evaluation and Reporting):

Cotton: 238 producers adopted UT resistance management guidelines for weeds, insects and disease; 241 producers used UT publications or UT internet resources to make changes in their production practices; 270 increased their understanding of pest management; 168 producers increase their income by following UT best management recommendations.

Soybean: 1078 producers adopted UT resistance management guidelines for weeds, insects and disease; 739 producers used UT publications or UT internet resources to make changes in their production practices; 1,931 increased their understanding of pest management; 881 producers increase their income by following UT best management recommendations.

Corn: 888 producers adopted UT resistance management guidelines for weeds, insects and disease; 1,004 producers used UT publications or UT internet resources to make changes in their production practices; 1,557 increased their understanding of pest management; 618 producers increase their income by following UT best management recommendations.

Household and Structural

In 2007, more than 105 pest management professionals (PMPs) were trained in IPM through 12 videotaped and interactive TV sessions for pesticide applicator training in category 7: Industrial, Institutional, Structural and Public Health Related Pest Control. Thirty-six formal presentations that

emphasized bed bugs, brown recluse and other spiders, odorous house ants, other pest ants, wood-boring beetles and other household/structural pests were provided to 1511 PMPs and others.

The odorous house ant, *Tapinoma sessile* (Say), is the principal ant entering structures in the mid-south region of the U.S. and was ranked as the number two pest ant in the country in 2003. Our urban IPM program has developed successful strategies for managing odorous house ants. This success has brought our program national recognition as we were requested to speak on this subject to 1016 PMPs in 18 locations in 10 states to provide solutions to a problem that has been plaguing PMPs for years.

Impacts reported by county Extension agents involved in household and/or structural IPM training were: 98 of 107 participants increased their understanding of household and structural IPM; 22 of 25 participants use or plan to use IPM to manage pests around the home. Only two counties reported these impacts; but 10 counties reported household IPM activities, indicating actual impacts (e.g. participants trained) were greater.

Child-serving Facilities and School IPM

A team to implement Child-Serving Facilities and School IPM was formed in 2001 at the University of Tennessee: UT YEAH (youth, environment and health). IPM workshops for child care workers and school pest management decision-makers were conducted in 2006. This year, an online interactive survey was piloted using a rural and urban school system. Names of facilities using low, medium or high IPM will be posted to the UT YEAH web site http://utyeah.utk.edu. Extension agents will deliver certificates that acknowledge child-serving facilities that reduce pest and pesticide risks and to market IPM in such facilities. The child-serving facility web site and the UT online blackboard site were modified so agents can easily download information needed to conduct meetings. Now that the online IPM survey system has been validated, all schools will be invited to participate.

Using the current UT YEAH-developed IPM continuum, results of the pilot online survey (one rural and one urban school system) revealed the following:

Buildings

83 of 99 (84%) schools are using high levels of IPM in their buildings

0 of 99 schools are using medium levels of IPM in their buildings

16 of 99 (16%)schools are using low levels of IPM in their buildings

Grounds

0 of 99 schools are using high levels of IPM on their grounds

12 of 99 (12%) schools are using medium levels of IPM on their grounds

0 of 99 schools are using low levels of IPM on their grounds

This was our first attempt at an IPM rating system and modifications to the rating system are already being implemented. IPM adoption in schools buildings is increasing, but much work is needed to increase IPM use on grounds.

Extracted from SUPER: an Extension agent from one county reported the following impacts: 110 of 131 participants surveyed increased their knowledge on Integrated Pest Management (IPM) strategies for controlling pests in child-serving facilities; 100% of participants surveyed increased their knowledge on the health risks from exposure to pesticides in child-serving facilities; 100% of participants surveyed increased their knowledge on the health risks from exposures to pests in child-serving facilities.

Imported Fire Ants

Our Imported Fire Ants in Tennessee web site (http://fireants.utk.edu) was updated with pages to help consumers find products and use sites, and to help growers find products used in the federal fire ant quarantine. A new chapter on managing fire ants in pastures was added to the department's pest management recommendations. Six county Extension agents and UT Extension Urban Entomologist Karen Vail are members of the Taking the Sting Out of Fire Ants Imported Fire Ant Community of

Practice for the eXtension program (http://www.extension.org/fire+ants) which is an national web-based initiative to promote awareness and management of fire ants. The more than 100 fire ant frequently asked questions and answers are one of the highlights of this web site. Downloadable presentations for county Extension agents are available on the Tennessee web site. Seven electric fire ant bait spreaders were distributed to counties throughout the state to allow Extension agents to conduct fire ant bait demonstrations.

Twelve meetings addressing fire ants were used to contact growers, landscapers, nursery producers, livestock and pasture managers, homeowners, and experiment station personnel. A presentation on fire ants given to district personnel was used to foster cooperation with National Resources Conservation Service.

A spring freeze and dry summer left many Tennessee farmers looking for hay, and unfortunately fire ants were imported with the hay in at least two cases. Communications, such as emails and web packet articles, were produced to warn agents about the potential fire ant introductions and to encourage inspection of hay before and after shipment.

From the SUPER reporting system: agents from 7 counties (Bedford, Davidson, Grundy, Polk, Rhea, Sumner and Williamson) and Extension specialists delivering consumer horticulture and fire ant programs reported the following impacts: 461 homeowners increased their knowledge of fire ant management; 23 of 23 growers increased their knowledge of fire ant management; 688 of 792 landscape and nursery participants increased their knowledge of fire ant management; 68 of 93 livestock and pasture managers increased their knowledge of fire ant management.

Fire ant mounds in Tennessee counties along the northern edge of fire ant range expansion, and in a few counties not previously surveyed, were examined for the fire ant parasitoid *Pseudacteon curvatus*. The parasitic flies were found attacking fire ants in 16 new counties. First released at three sites in 2000, *P. curvatus* was found in 20 counties in 2004, and in 12 more counties in 2005. The fly appears to be spreading with its hosts. Almost everywhere we find fire ants, *P. curvatus* can be found.

Activities of IPM Coordinator

I continue to serve as a member of the child-serving facilities/school IPM team (UT YEAH) and the fire ant research and education team (FARET) (see their activities above). I developed an online Extension publication on identification and management of the grape root borer, the most damaging pest to grapes in Tennessee (Univ. Tennessee Extension W171. http://utextension.tennessee.edu/ publications/ wfiles/W171.pdf)

Since November 2006 the vast majority of my time has been spent serving as director of the Lindsay Young Beneficial Insects Laboratory (LYBIL) at UT where we mass-rear predators of the hemlock woolly adelgid. In 2007, more than 213,000 adults of the coccinellid *Sasajiscymnus tsugae* were reared, a 123% increase over the number reared in 2006. Of these, almost 197,000 were released on federal and state lands (the Great Smoky Mountains National Park, Cherokee National Forest and state Wildlife Management Areas). Production of the derondontid beetle *Laricobius nigrinus* increased 3-fold in 2007, with more than 8300 beetles produced. Almost 6000 were released at Great Smoky Mountains National Park, Cherokee National Forest and into study field cages. High mortality of adult *L. nigrinus* in the laboratory after emergence prevented more from being released.

Other

Extension IPM impacts reported to SUPER (for each commodity, a unit or units, such as a University department are also reporting, so results may be for more counties than listed):

Mgmt. of fruit and vegetable insects and diseases (5 counties reporting):

- 32 of 74 fruit and/or vegetable producers adopted an integrated pest management approach to insect, mite and disease control;
- 42 of 83 fruit and/or vegetable producers learned to identify pest insects, mites and diseases;
- 26 of 60 fruit and vegetable producers increased business profitability and sustainability

through improved insect, mite and disease control.

Mgmt. of horticulture insects and diseases (8 counties reporting):

- 114 of 226 green industry personnel adopted an integrated pest management approach to insect, mite, and disease control in turfgrass and/or ornamental plants.
- 405 of 613 green industry personnel learned to correctly identify pest insects, mites and diseases of turfgrass and/or ornamental plants.
- 10 of 27 green industry personnel increased business profitability and sustainability through improved insect, mite and disease control in turfgrass and/or ornamental plants.

Wheat production (8 counties reporting):

- 451 wheat producers implemented one or more wheat management practices based on data provided by UT (e.g., conservation tillage, plant population, growth retardants, IPM strategies, disease and weed control).
- 110 producers report a 4 % increase in wheat yield by using recommended crop management strategies for insects, weeds or plant diseases.
- 217 wheat producers adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).
- 287 wheat producers improved their income by following the recommended best management practices for crop production, including plant pest management.

Tobacco (9 counties reporting):

- 152 tobacco producers adopted an integrated pest management approach to insect control (scouting, economic thresholds, conservation of beneficial insects, and/or recommended pesticides).
- 516 tobacco producers increased their knowledge of pest management, economic thresholds and proper use of pesticides (insecticides, herbicides and fungicides).

Master Gardener (22 counties reporting):

- 870 Master Gardeners gained knowledge and confidence in entomology.
- 775 Master Gardeners gained knowledge and confidence in integrated pest management.

Stored Grain (1 county reporting):

- 350 producers and grain elevator managers used stored grain integrated pest management (IPM) strategies or sanitation, loading, aeration and monitoring (SLAM).

Texas IPM Report -2007

Program Management

The Texas IPM Program has had a full time IPM Coordinator since it's inception in 1972. The current IPM Coordinator has been in place for 14 years. The program is funded both by state and federal IPM funds, Federal Funds are approximately $600,000 and state funds approximately $1.4 million. These funds are leveraged with grower funds, industry funds and funds from various cooperators and granting agencies. Approximately 85% of our budget goes for salaries. Extension IPM personnel include 21 Extension Agents-IPM who serve from one to four counties, four urban IPM Program Specialists who serve major metropolitan areas, one statewide pecan IPM Program Specialist, one IPM Program Specialist for greenhouse/nursery IPM and an IPM in Schools Coordinator. These faculty work with County Extension Agents, Extension Specialists and researchers and interact with growers on a daily basis to increase the implementation of IPM across the state. The program works very closely with the Texas Pest Management Association who represents growers and hires scouts and demonstration assists for the Texas IPM Program with grower funds. Each IPM unit (Extension Agent, local growers, consultants and agribusiness representatives) develops priorities for the local program. This complements statewide priorities in the Extension Strategic Plan.

Agricultural IPM

Row crops

- 21 Extension Agent-IPM positions which deal mainly with row crops
- Conduct ca. 250 applied research/demonstration projects to help producers adopt/adapt new technology on their farms
- in 2007, 235 issues of newsletters to 6,000 clientele, conducted 14,000 farm visits, prepared 274 news articles, 120 radio programs and trained 76 scouts and 88 consultants
- statewide evaluations of over 225 cotton growers associated with IPM programs indicated the following outcomes:
    - -94% of growers indicated that IPM increased their net profits by an average of $34.24/acre
    - Estimated the value of the IPM program including educational programs, monitoring of crops, applied research and demonstrations conducted at $34.43/acre
    - 80% of growers indicated that the Texas IPM Program was instrumental in them adopting new technology on their farms
- Extension Agents-IPM leveraged our state and federal funds with over $750K of support from grants, growers and agribusinesses

Pecans

- have developed a statewide real time prediction map for the pecan nut casebearer, the number one insect pest of Texas pecans
- developed a statewide network of 50 volunteers in 25 counties who monitor pecan nut casebear populations with pheromone traps and report data to a central location to allow for real-time predictions on pecan nut casebearer populations
- current predictions available on pecankernel.tamu.edu website
- pecan IPM program evaluations have indicated a $6 million annual impact on the Texas economy

Fire Ants

- demonstrated the effectiveness of a number of new fire ant bait products as well as tested the effectiveness of a number of home remedies and organic products
- demonstrated the utility of community-wide fire ant management programs
- documented establishment of two species of phorid flies and are monitoring their dispersal
- cooperated with Kathy Flanders at Auburn and others to develop the "eXtension Fire Ant Project" Community of Practice
- in April will coordinate efforts with Central Garden and Pet Company for a fire ant awareness both at a NASCAR car race at the Texas Motor Speedway in Dallas- potential audience of ca 400,000

Community-based IPM

- training clientele obtaining Habitat for Humanity homes in IPM using ISEC program
- developed data on fire ant management in and around nursing homes and a powerpoint presentation to train nursing home staff
- brought IPM in Schools program under Texas IPM Program. Have trained 1/2 of IPM Coordinators in 1033 Texas school districts
- demonstrated and field tested the IPM in Schools Cost Calculator in 5 states
- Elementary Insects curriculum to teach school children about insects and IPM
- cooperated with IPM Institute on certification of two school districts in the IPM Star certification program
- reach an audience of more than 14,000 per month through collaboration with Neal Sperry gardening electronic newsletter

IPM Internship Program

- since 1998, we have trained 69 interns from 10 universities to date including 9 in 2007.. Recruiting for 8 interns for 2008

Awards

- successful in winning 3 Friends of IPM Awards from the new Southern Region Friends of IPM Awards Program

Administrative Support

The Texas IPM Program budget is controlled by the IPM Coordinator through the Associate Department Head and Department Head of the Entomology Department overseen by the Associate Director for Extension's Budget Center. District Extension Administrators are the supervisors for Extension Agents-IPM while the IPM Coordinator and the Associate Department Head for Extension Entomology are supervisors for Extension Program Specialists.

SERA-IEG3 2007 ANNUAL REPORT FOR THE VIRGIN ISLANDS

Jozef Keularts

PROGRAM MANAGEMENT

The Virgin Islands IPM program has been implemented since approximately 1979. The IPM Coordinator dedicates 50% of his time in the IPM program. The financial support is by Smith-Lever 3(d) funds, now approximately $25,000 of which about 95% is used for salaries. The non-salary part of the budget is under full control by the IPM coordinator. Some funding from the Southern Plant Diagnostic Network was also available. No technical support is currently in place and although reasonable laboratory facilities are available we rely on outside assistance, particularly university of state facilities in Florida for some of the diagnostics. The IPM programs provides assistance to crop farmers, vegetable and fruit crops in particular, ornamental production, urban pest management and youth programs.

PROGRAM DELIVERY

The total area of the Virgin Islands in active crop production is approximately 600 acres Nearly all of the farms use multiple cropping with all commodities in close proximity. Most farmers tend to their farms after their regular employment's work hours. Limited use of hired employees provides little time for pest management. Pest monitoring is usually incidental to other farm activities and the IPM program' assistance in pest management consists mostly on pest identification and recommendation. If chemical control is required recommendations are provided using locally available products as much as possible. Multiple cropping and frequent high winds make pesticide choices and application difficult resulting in significant crop losses.
IPM's involvement in youth development is provided through field trips and demonstrations with University students, elementary schools, 4-H and other youth groups.

School IPM was implemented to a limited extent in several private schools in the past but due to personnel changes these will have to be restarted. School IPM will be started in two public St. Croix elementary schools this year in collaboration with the Virgin Islands Department of Planning and Resources (DPNR). Severe budget short falls within the Virgin Islands Department of Education most likely will mean that these program may have a limited scope. Some financial assistance through DPNR to increase the scope in these schools may be available.

Urban IPM was the most time consuming part of the program as it involved a large number of site visits to residences as well as business and public sites. Many of the problems experienced at those sites did have long term non-chemical solutions.

All IPM efforts could be supported through publications available on-line. The websites most frequently used were those of the University of Florida and the Florida Department of Agriculture Division of Plant Industry.

The IPM website of the University of the Virgin Islands Cooperative Extension Service (CES) is under development. The core part is expected to be completed before the fall of 2008 and is expected to be on-line by October 2008. The website uses a

database for most of its pages which means that updates of the entire website can be implemented almost immediately after new information becomes available.

PROGRAM INVOLVEMENT

The IPM program and the PSE program of the University of the Virgin Islands Cooperative Extension Service are coordinated by the same person. The IPM coordinator works cooperatively with the CES Horticulture program as well as with the Virgin Islands Departments of Planning and Natural Resources, Health and Education.

SERA-IEG3 2007 ANNUAL REPORT FOR VIRGINIA

Ames Herbert

ACTIVITIES: The Virginia IPM Program was extended by 25.89 (FTEs) volunteer Virginia Tech specialist faculty (Weed Science, Plant Pathology, Entomology, Horticulture) and Virginia Cooperative Extension (VCE) agents throughout the Commonwealth during the reporting period (a 46% increase from 2006). A total of 262 grants, contracts and donations awarded a total of $3,191,249 to supplement IPM program development and delivery.

OUTCOMES: A total of 854 (a 13% increase) workshops, short courses, media pieces (radio/television), demonstrations or presentations were presented to a varied audience including homeowners, public school officials, food preparation staff, pesticide dealers/distributors/handlers, growers, and forest, plant nursery, landscape, and golf course managers across the Commonwealth, and to a total of 26,417 (a 40% increase) extended learners (4 or more hours of training).

DISSEMINATION ACTIVITIES: A total of 100 new media offerings were developed including VCE publications, manuals, guides, websites, and trade journal articles. A total of 483 non-Virginia Tech volunteers contributed 4,538 hours to IPM program activities.

FUTURE INITIATIVES: To develop a new regional photo ID guide of stink bug pests and damage symptoms to fruit, vegetables and row crops. To develop a new system for assisting VCE agents with documenting and linking IPM outcomes and impacts to the CSREES Pest Management Planned Program.

IMPACTS (Selected):

-Improved management of troublesome grass weeds in turfgrass saved $400 per acre
-The Virginia Tech Plant Disease Clinic reduced response time for problem diagnosis
-The Virginia Tech Weed Identification Clinic improved with website delivery changes
-Virginia School IPM adoption was expanded to 4,014 new staff and 25,528 students
-Pre-construction termiticide applicators skills were improved by 40%
-Soybean acreage protected from pests with savings of $650,000 to growers
-Soybean rust detected with significant fungicide savings to growers
-New ID guide increased the precision of soybean insect scouts throughout the U.S. and Canada
-Confronted with a new wheat pest, the Extension-IPM paradigm prevented spread and potential loss to 25,000 acres of wheat
-Improved weather-based peanut disease advisory saved growers $1.1 million
-The Virginia Ag Pest Advisory now reaches a regional audience with 87% approval rating
-Tiny parasitic wasp could reduce damage to vegetable crops by 60-70%
-The Virginia Potato Disease Advisory saved $360,000 for commercial potato growers
-1,407,415 pounds of pesticide wastes were destroyed reducing the threat of contamination by leaching into soils and ground water

PUBLICATIONS (Selected, not including manuals, guides, or newsletters):

Herbert, D.A., Jr., S. Malone, E. Cullen, and S. Ratcliffe. 2007. Identification of soybean aphid and look-alike species. Northcentral IPM Center, Univ. of Illinois, VCE Publ. 444-373.

Herbert, D.A., Jr., S. Malone, S. Aref, R.L. Brandenburg, D.L. Jordan, B.M. Royals, and P.D. Johnson. 2007. Role of insecticides in reducing thrips injury to plants and incidence of tomato spotted wilt virus in virginia market-type peanut. J. Econ. Entomol. 100: 1241-1247.

Flanders, K., D.A. Herbert, Jr., D. Buntin, D. Johnson, K. Bowen, J.F. Murphy, J. Chapin, and A. Hagan. 2006. Barley yellow dwarf in small grains in the southeast. Alabama Coop. Ext. Publ. ANR-1082.

Fleischer, S., G. Payne, T. Kuhar, D.A. Herbert, Jr., S. Malone, J. Whalen, G. Dively, D. Johnson, J. Hebberger, J. Ingerson-Mahar, D. Miller, and S. Isard. 2007. *Helicoverpa zea* trends from the northeast: suggestions towards collaborative mapping of migration and pyrethroid susceptibility. Plant Health Progress. doi: 10.1094/PHP-2007-0719-03-RV

Gatton H., T. Kuhar, K. Jennings, D. Monks, S. Rideout, S. Toth, C. Waldenmaier, M. Weaver, S. Whitney-King, and H. Wilson. 2007. Pest management strategic plan for tomato in Virginia, North Carolina and Delaware. 58 pp. National IPM Center. USDA/CSREES, Office of Pest Management Policy, Washington, DC. http://www.ipmcenters.org/pmsp/pdf/SRTomato.pdf

Cassell M., and T. Kuhar. 2007. Bean leaf beetle biology and management in snap beans. VCE Publ. 444-009. http://www.ext.vt.edu/pubs/entomology/444-009/444-009.html

Jordan, T.A., C.A. Laub, and R.R. Youngman. 2007. Slugs in field corn. VCE Publ. 444-109. www.ext.vt.edu/pubs/entomology/444-109/444-109.html

Laub, C.A., and R.R. Youngman. 2007. Virginia alfalfa IPM source website. www.alfalfaipm.ento.vt.edu

Bush, E. 2007. Reducing pesticide use in the home lawn and garden. VCE Publ. 450-725. http://www.ext.vt.edu/pubs/plantdiseasefs/450-725/450-725.html

Bush, E., and K. Yoder. 2007. Brown rot on peach and other stone fruits. VCE Publ. 450-721. http://www.ext.vt.edu/pubs/plantdiseasefs/450-721/450-721.html

Bush, E., and M. Hansen. 2007. Plant problem image gallery and VCE login page. http://www.ppws.vt.edu/ipm/image_gallery.html

Hansen, M.A., A. Niemiera, and E. Day. 2007. Problem-free shrubs for Virginia landscapes. VCE Publ. 450-236.

Hansen, M.A., A. Niemiera, and E. Day. 2007. Problem-free trees for Virginia landscapes. VCE Publ. 450-237.