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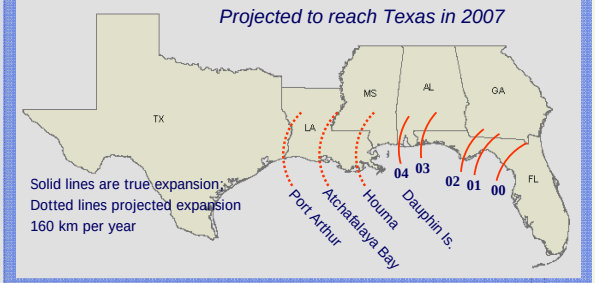
The Cactus Moth: Friend Turned Foe

January 2005

In September 2003, PPQ committed to developing a strategic plan to delimit, monitor, and mitigate the spread of the South American cactus moth in North America. To this end, PPQ is funding an ARS/CPHST cooperative program to increase detection efforts and test the sterile insect technique to establish a barrier that could stop the cactus moth's westward movement toward Texas and Mexico along the Gulf Coast.

Until its appearance in the US as an invasive insect, cactus moth was considered the undisputed poster child for biological control of weeds because of its dramatic role in reducing expansive populations of invasive prickly pear cacti in Australia, South Africa, Mauritius and the Hawaiian Islands. Based on the success of the cactus moth in controlling prickly pear cacti, the moth was introduced onto the island of Nevis in the Caribbean in 1957 to control unwanted native species. The cactus moth later dispersed, either naturally or by unrecorded introductions, to other Caribbean islands including Hispaniola, the Bahamas, Puerto Rico and Cuba.

The cactus moth was first recorded in the continental US from Big Pine Key in south Florida in 1989. The cactus moth has expanded its range north and west along both the Atlantic and Gulf Coasts. Recent surveys have confirmed established populations of the moth as far north as Bull Island near Charleston, South Carolina and as far west as Dauphin Island, Alabama.



Prickly pear cactus is of minor importance in the US as a domestically produced food crop. Most of the commercial value in agriculture involves the dependence of ranchers on prickly pear cacti during drought years and its use in the ornamental nursery and landscape industries in Texas, New Mexico, Arizona and California. However, prickly-pear cactus has significant value as an ecological plant, adding to wildlife habitat, ecosystem structure and biodiversity in both developed and undeveloped areas. Additionally, further westward spread could lead into Mexico where prickly-pear cactus is a major agricultural commodity and has significantly larger political importance. Over 2% of Mexico's total agriculture output is based on prickly pear cacti production for fruit (tunas) and pads (nopales). **Lynn Garrett** with CPHST has produced an excellent White Paper on the "Economic Impact from Spread of *Cactoblastis cactorum* in the United States".

Eggs of the cactus moth are laid in a chain or eggstick containing 50-90 eggs. After emerging, larvae bore into cactus pads and feed gregariously.

The potential impact of the cactus moth was initially brought to the attention of APHIS at a workshop organized by concerned scientists and sponsored in part by the CPHST National Biological Control Institute held in Tampa, FL in September 2000. The papers from this workshop were assembled in the *Florida Entomologist*, 2001, vol. 84, no. 4 and can be accessed at: http://www.fcla.edu/FlaEnt/fe844.htm. PPQ's New Pest Advisory Group (NPAG) took up the cactus moth in 2001 and recommended to the PPQ Executive Team that the PPQ Pest Detection and Management Programs staff manage and develop a long-term plan to address this pest. An APHIS position paper was drafted by **Al Tasker**, PPQ-PDMP, in December 2002, and in July 2003 the NPAG recommendation was approved by the Deputy Administrator.

The Strategic Plan, which was developed under the leadership of **Joel Floyd**, PPQ-PDMP, addresses concerns for: 1) Survey and detection of infestations along and in front of the moth's westward expanding range; 2) Identification of non-target Lepidoptera that feed on prickly pear cacti; 3) Regulation of importation and domestic movement of prickly pear cacti plant material; 4) Eradication and control of known infesta-

The Cactus Moth (continued from page 1)

tions using mechanical removal, insecticides and sterile insect releases; 5) Research to refine monitoring and control protocols; 6) Outreach activities to increase public awareness; and 7) Cooperation with Mexico regarding cost and information sharing.

The USDA, Agriculture Research Service (ARS) has moved quickly to develop and test a synthetic lure, trapping protocols, artificial diet and mass-rearing techniques, and control strategies using insecticides and sterile insect releases. **Ken Bloem** (CPHST, Tallahassee, FL) has worked closely with ARS to develop the necessary technologies to stop the spread of the cactus moth. More recently, the NAPPFAST risk zone mapping program is being used by **Dan Borchert** (CPHST, Raleigh, NC) to analyze cactus moth life cycle phenology in the US and Mexico and map larval and adult activity to indicate the most appropriate times to monitor or survey for the various life stages. **Ron Weeks** (CPHST, Gulfport, MS) is cooperating with the Georesources Institute (GRI) at Mississippi State University to build a web-based database that will accommodate the use of hand-held units to gather detailed host distribution data, produce geospatial maps, and send insect survey data to CAPS coordinators in each state for deposition into NAPIS. **Dave Bartels** (CPHST, Mission, TX) is working with ARS in Texas and the MSU-GRI to field validate infrared reflectance technologies as a mapping tool for prickly pear cacti species.

Unfortunately, our ability to control the cactus moth is a race against time. Since 2001 the moth has been spreading westward along the coast at the rate of approximately 160 km per year and Dauphin Island, AL, the site of the current westernmost infestation, is the last Gulf Coast island with road access until Galveston Island in North Texas. Once the moth reaches the desert Southwest there are 31 species of prickly pear cacti that are at risk to attack by the moth, 9 of which are endemic. Mexico, the center of endemism for prickly pear cacti, has 54 species at risk, 38 of which are endemic.

Submitted by Ken Bloem

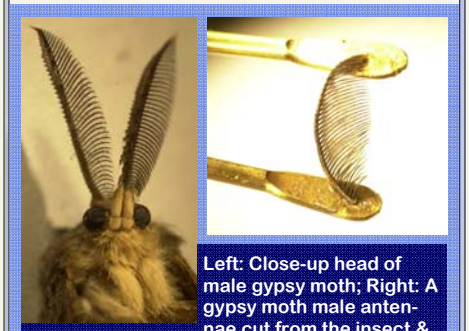
Development of Pest Detection & Monitoring Tool-Based Semiochemicals

January 2005

Areas of focus for the Otis Pest Survey, Detection and Exclusion Lab's research and development work are to identify and develop semiochemicals for detection of pest introductions, develop systems for monitoring established pest populations, and for manipulating insect behavior for control.

Target pests are selected through a variety of mechanisms utilizing a number of information sources. The goal, however, in this process is to select those exotic pests that have a high probability of introduction and a high damage potential if introduced. Pests which are already established are chosen based on the Agency's direction and needs for the specific program. Depending on the pest and the amount of background research that has already been done, the laboratory develops a plan to identify the behaviorally active semiochemicals, formulate them in appropriate controlled release devices and develop trap(s). Field trials in the pests' native range are conducted as a final step in the development process. This simplified description of the process does not include the multiple steps involved in the final delivery of a usable tool or system for program use. Recent examples of successful completion of this process (program delivery) are semiochemical baited traps for the Siberian moth, the Russian rosey moth, and the nun moth.

The emerald ash borer and the Asian longhorned beetle, two of PPQ's emergency programs, are also currently the focus of much of the lab's semiochemical identification projects. We are also developing a monitoring detection trap/lure system for *Sirex noctilio*, a world-wide pest of pines.



Left: Close-up head of male gypsy moth; Right: A gypsy moth male antennae cut from the insect & placed across 2 recording electrodes. Plant & pheromone odors are then passed over the antennae, & the response measured.

In the past, semiochemicals have been identified or refined for the pine shoot beetle, the false codling moth, apple ermine moth, cherry ermine moth, the old world bollworm and the browntail moth, etc. In many of these cases, unique trap design or modification of existing trap designs have been developed to provide a "complete" monitoring tool.

The mating disruption technique, which is currently the most widely used gypsy moth control technique, is also supported by the gypsy moth PSDE Lab. The focus has been on development of controlled release formulations, delivery systems and evaluation of field efficacy. In the future, we hope to utilize the knowledge and technology gained through this work to develop control programs for other target species.

We are initiating projects involving the development of bio, micro and nano-sensors for detecting specific chemical and chemical signatures for use in APHIS in its detection and monitoring efforts. We are anticipating that chemical signatures can be identified that characterize the presence of insects and pathogens before plants show outward symptoms and for hard-to-detect insect pests. Once identified, the lab will focus on the development of bio or electronic detectors as appropriate. We envision application for these detectors both in field situations and in more controlled environments, such as containers, ship holds, plant inspection stations, and importing greenhouses and warehouses. The development of this technology will allow APHIS to increase the capacity and sensitivity of its pest survey and monitoring efforts.

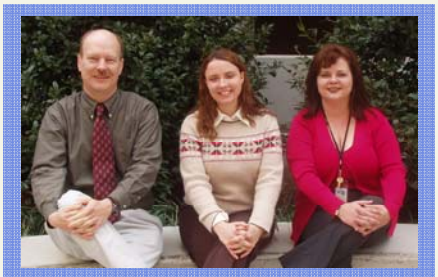
Submitted by Vic Mastro

CPHST Develops Regulatory Plant Protection Curriculum in Cooperation with North Carolina State University

January 2005

CPHST (**Scott Redlin**, **Alison Neeley** and **Christina Devorshak**) has undertaken the development of a regulatory curriculum in conjunction with North Carolina State University. A seminar course was presented Spring semester (January-May 2004) at NC State University. The seminar facilitated by Scott Redlin and assisted by Alison Neeley, featured speakers from the five program areas of CPHST (Survey Detection and Identification, Risk and Pathway Analysis, Agricultural Quarantine and Port Technology, Integrated Pest Management and Eradication, and Biotechnology and Molecular Diagnostics). There were invited speakers, including **Dr. Dunkle** and **Dr. Gordh**, as well as representatives from other organizations including the PPQ Professional Development Center (PDC), USDA Office of Risk Assessment and Cost-Benefit Analysis (ORACBA), North Carolina Department of Agriculture (NCDA), and PPQ Preclearance Programs.

Approximately 35 graduate and undergraduate students registered for the course. The results of surveys indicated that overall, students were pleased with the seminar. They appreciated the variety of topics that the seminar addressed and the fact that there was a different speaker from a different part of the organization each week. Most indicated that the topics presented were interesting and valuable. The results of the two surveys also illustrate that there is both a need and a demand for curriculum at the University level that focuses on the regulatory aspects of plant protection.



Left to Right: Scott Redlin, Alison Neeley & Christina Devorshak

At the same time, there are many advantages to be gained for the organization by developing this curriculum. First, a strong cooperative relationship has been established between the Center for Plant Health Science and Technology and different departments in the university. Second, and perhaps most important, this curriculum will provide training to students in relevant fields on key aspects of regulatory plant protection. It is expected that this will provide the organization with a professionally trained workforce that will enter the organization with a thorough understanding of PPQ's mission and activities.

The next phase of the curriculum development is well under way. An upper-level undergraduate and graduate level 3-credit hour course will be taught beginning in January 2005. The course, "Challenges in Plant Resource Protection" has evolved largely from the seminar that was taught this past year. The purpose of this course is to provide applied training to students on the regulatory aspects of plant protection using real world case studies, scenarios and issues, and by developing hands-on problem solving abilities. Students registered this semester come from a wide range of backgrounds including plant pathology, entomology, environmental technology, botany, horticulture, zoology and general biology. Ultimately, this course will serve as the keystone course for a regulatory plant protection curriculum minor for undergraduate and graduate students.

Submitted by Christina Devorshak & Alison Neeley

CPHST Participates in Michigan State University's Food Law Program

January 2005

CPHST is launching a new cooperative effort with the Michigan State University. MSU has developed a distance learning program for professionals interested in understanding the complexities of Sanitary and Phytosanitary (SPS) regulatory systems. This program, known as the International Food Law Distance Education Certificate Program, received the 2003 Excellence Award in College and University Distance Education from the American Distance Education Consortium (ADEC).

Courses are taught by an international network of academic, legal, and regulatory professionals who understand the complexities of national and international SPS systems and how they impact the flow of food and agricultural products across national boundaries. The IPPC course includes sections on the relationship of the IPPC to the WTO, Regional Plant Protection Organizations, Invasive Species, Import and Export Systems, Port of Entry Operations, Pest Risk Analysis, Surveillance, Eradication and Treatment, and special problems associated with developing countries. CPHST staff will be instructors for several of these sections. **Dr. Lonnie King**, past APHIS Administrator, is the lead instructor for the OIE course. **Robert Griffin** and **Ron Sequeira** of APHIS-PPQ-CPHST are instructors for risk analysis and risk management modules, respectively.

Left to Right: Ron Sequeira & Bob Griffin

Spring semester courses begin the second week of January. Students spend an average of 9 to 12 hours per week doing reading and course work. The courses are held completely over the Internet and no additional books or programs are required. An International Food Law Certificate is issued upon the successful completion of four distance education food law courses, which may be taken in any order. http://www.reg.msu.edu/ROInfo/EnrReg/LifelongEducation.asp

The preview web site for the International Food Laws Certificate Program is: http://vu.msu.edu/preview/anr-ifl/

This latest effort by CPHST will help bolster the training opportunities for regulatory experts worldwide and provide additional education channels for APHIS employees.

Submitted by Ron Sequeira & Bob Griffin

Biological Control of Giant Salvinia

January 2005

Salvinia molesta, giant salvinia (GS), is a rapidly proliferating native aquatic fern from southern Brazil. A federally-listed noxious weed, GS damages wetland and aquatic ecosystems by overgrowing and replacing the native plants that serve as food and habitat for native animals and waterfowl. The first detection of GS in the U. S. (outside of horticultural cultivation) was in 1995 at one location in South Carolina. Although this infestation was quickly eradicated, GS was discovered in Texas in 1998. Surveys over the next 2 years confirmed GS establishment in numerous other states, including Alabama, Arizona, California, Florida, Georgia, Hawaii (Oahu), Mississippi, and North Carolina. By 2003, GS was found on the big island of Hawaii, and it reappeared at a new location in South Carolina. The most recent new state detection was Virginia in August 2004, bringing the total number of GS-infested states to 11. In addition, GS is now reportedly established in northern Mexico.

A GS biological control project for TX was initiated at the CPHST Pest Detection, Diagnostics, and Management Laboratory (PDDML) in Edinburg, TX, in 2000. *Cyrtobagous salviniae*, commonly known as the salvinia weevil, was collected in Australia in May 2000 from sites where GS was successfully brought under biological control in the early 1980's by releases of weevils from southeastern Brazil. The weevil has long been recognized as the leading and most often used GS control strategy, successfully used in more than nine countries throughout the world. The weevils arrived at the PDDML Arthropod Quarantine (AQ) Facility on June 11, 2000. A laboratory culture was established and maintained in AQ until all requirements were met for the field release petition. The approved PPQ permit was issued in October 2001, and field releases into 6 sites in E. TX began that same month. Following its release from AQ, weevil production was initiated in a small greenhouse. As the culture expanded, mass production was moved to outdoor field insectary cages. A semi-automated greenhouse system was incorporated into mass production this past year. To date, the mass production system has provided ~ 1.32 million *C. salviniae* for field release to establish field insectary sites for subsequent redistribution of agents. Initially, only adults were field-released; however, subsequent releases have primarily been conducted using GS plants containing all stages of *C. salviniae*, which has significantly increased the number of weevils released and more rapid establishment in field insectary sites.

(Left) Giant salvinia infested pond, Bridge City, TX, March 2002, following first release of *C. salviniae* (darkened area in the lower right corner). (Right) Same pond, November 2002, ~ 9 months later. Small patches of GS remain along the shoreline, visible in the upper part of the photo. (Note: That's a dead alligator in the middle of the left photo!)

A technology transfer aspect was added to the project in FY03 to coordinate delivery of the field insectary technology to other states and to additional sites in TX. Weevil release sites have increased to 25 with the addition of 19 sites in LA, NC, and TX. Collaborators in these states include PPQ Eastern and Western Regions; U.S. Army Corps of Engineers; and NC Department of Agriculture; who have been assisted by personnel from Texas Parks & Wildlife Department; Louisiana Department of Wildlife & Fisheries; and San Jacinto and Sabine River Authorities. Establishment of *C. salviniae* has been recorded at all release sites to date. In all but a single release site located in East Texas, effect time for GS control by *C. salviniae* has been measured in terms of months rather than years (Figure 1). The most recent visit to the site in the photo was in the summer of 2004. The pond remains clear of GS, except for small infestations along the shoreline.

The one remaining East Texas site is currently serving as a template for biological control assessments through the use of remote sensing technologies. In collaboration with USDA-ARS Integrated Farming and Natural Resources Research Unit, Weslaco, TX, this site has been captured as before and after images using aerial infra-red imagery (Figure 2). These images show a 14% increase in GS damage by *C. salviniae* between April and July 2004. Implementation of modern-day remote sensing technologies utilizing aerial imagery and videography will provide useful tools for documenting GS distribution and extent of infestation and *C. salviniae* impact and dispersal in hard-to-access or large areas of infestations.

The PDDML GS program also supports other cooperators' biological control efforts. Weevil shipments are provided to the CPHST Decision Support and Pest Management Systems Laboratory, Biological Control Unit, Brawley, CA, to supplement their weevil production for biological control programs in AZ and CA. Bi-weekly weevil shipments are made to support additional host specificity testing by the Hawaii Department of Agriculture, as the necessary first step toward establishing a biological control program for GS-infested Hawaiian Islands. Researchers at Texas A&M and Louisiana State Universities occasionally request weevils for laboratory studies. Other GS project cooperators include scientists with the University of Texas - Pan American and Monterrey Tech University (Mexico).

Project plans for the remainder of FY05 include expansion of the GS biological control and technology transfer program into MS, as well as into other GS-infested eastern and southeastern states. Later this year, mass production will be significantly downsized but will continue to supply weevils to supplement establishment of additional field insectary sites. Transfer of technology to cooperators in participating states is expected to be completed by the end of FY06.

Aerial color-infrared photographs of a giant salvinia-infested pond in Bridge City, TX, showing a 14% increase in *C. salviniae* feeding damage from April to July 2004.

Submitted by Dan Flores & Leeda Wood

CPHST Scientist Visits China Regarding the *Alternaria* issue on Ya Pear

January 2005

How do problematic international trade issues that involve quarantine pest problems get resolved? Perhaps in steps and with the use of scientific principles. The Chinese Ya Li or Ya pear program was shut down in December 2003, after the detection of a quarantine significant post harvest fungus, *Alternaria yaliinficiens*, at US ports of entry and subsequently in American supermarkets. Given the importance of this market to the Chinese, USDA agreed to work with the Chinese to determine what scientific information would be needed to re-open the Ya pear market. PPQ staff and China's General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) had previously met in February and September 2004 to describe an approach for resolving the issue and proposed several ways to evaluate several potential mitigation methods. China requested that a regulatory scientist collaborate with their specialists in an effort to expedite resolution of this issue. Because this issue involved a quarantine pest that is detected post harvest, it was agreed that the collaboration would occur in China to increase the ability to mitigate the pest before pears were shipped to the US.

Scott Redlin, plant pathologist with PPQ CPHST's Plant Epidemiology and Risk Analysis Lab (PERAL), recently returned from a five week visit to the People's Republic of China. Soon after arrival in Beijing he was briefed by USDA APHIS-International Services and met regularly with officials from the Government of China, i.e., National and Provincial regulatory agencies as well as university professors and industry representatives from Hebei and Shandong Provinces, the major location of Ya pear exports to the U.S. In a collaborative manner, he completed several experiments in Hebei Province which were outlined in the document "Cooperative research draft of risk mitigation measures to *Alternaria* infection after Ya pear harvesting". The collaborative work resulted in a summary document which was jointly presented at the 13th Sino-U.S. Bilateral Meeting at Qiong Hai City, Hainan Province during December 7-9, 2004. Prior to this meeting, Dr. Redlin briefed staffs from International Services, PPQ's Phytosanitary Issues Management (PIM) Staff, and the USDA Foreign Agricultural Service on his four week collaboration with the Chinese regulatory officials and regulatory scientists. During the intensive negotiations with the Chinese regarding next steps for the Ya pear issue, Dr. Redlin provided critical advice and assistance to the negotiating team, and helped draft a protocol for a follow-up "test shipment" of Ya pears to be sent to Beltsville, MD under a PPQ research permit. Prior to shipment from China, several mitigation procedures were applied to the pear fruit. Ya pears recently arrived in the U.S. and they are currently being evaluated by PPQ and Chinese scientists. Both sides are hopeful that one or more of the various mitigations will be effective in reducing the risk of introduction of this exotic fungus.

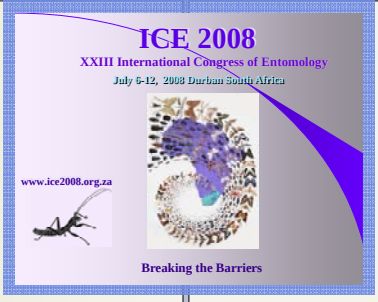
Scientists from left to right: Mr. Yan and Dr. Liu, both of the China Academy of Inspection and Quarantine, Dr. Redlin, PERAL, and Mr. Zhao, Hebei Province Regulatory Official.

Submitted by Scott Redlin

International Affairs Committee of the Entomological Society of America

January 2005

Professional societies, such as the Entomological Society of America (ESA), offer untapped resources available to all CPHST employees. The ESA has several standing committees, including the International Affairs Committee (IAC). The IAC is a perfect example of how we can enhance our projects, and at the same time share results with the scientific community.



The purpose of this committee is to make members aware of the international aspects of entomology as a science and profession. The IAC has 15 members with each member serving a 3 year tour, and 5 vacancies are therefore available each year. There are several activities involving the committee, primarily at the annual meetings, that offer opportunities to highlight CPHST programs:

- **Display Table**: The ESA provides a free table and bulletin board near the registration to promote international aspects of entomology, including invasive species and quarantine concerns. CPHST and PPQ literature has become a major component of this display.
- **Annual Symposium on any aspect of International Entomology**: Recent symposia have included biological control of invasive species, and most recently collaborative Integrated Pest Management (IPM) projects between the US and developing countries, stressing a project at Montana State University involving Collaborative Research Support Programs and food production, and how that relates to the global economy.
- **Gratis ESA journal subscriptions**: The ESA offers 25 gratis electronic subscriptions to ESA journals, through this committee, to entomologists in developing countries. This year, we decided to stress supporting entomologists in Iraq by working with a program at the University of Hawaii.
- **International Congress of Entomology**: This congress is held every four years, and the committee works with the host country to help promote the congress through the ESA. The next congress is in 2008 in South Africa, and there are some unique opportunities for CPHST involvement (see image).

Anyone interested in exploring opportunities with this committee can contact **Gary Bernon** (Gary.Bernon@aphis.usda.gov) or the ESA directly for details.

Submitted by Gary Bernon

PPQ's Mid-Level Leadership Program, Leading in the 21st Century (L-21)

January 2005

The PPQ succession planning figures estimate that in the next 5 years, or by 2010, PPQ could lose roughly 63% of its managers and supervisors GS-13 and above to retirement. Because APHIS' mid-level leadership program has a limited number of PPQ-designated slots, the PPQ Executive Team (ET) proposed the formation of a mid-level leadership program designed specifically to develop leadership skills, targeting PPQ employees in grades GS-11 and above. In response, the Professional Development Center (PDC) created PPQ's Mid-level Leadership Program, Leading in the 21st Century (L-21), that focused on 12 PPQ leadership competencies.

Graduates of L-21 Class of 2004

The 12-month program began on December 10, 2003, with participants selected from throughout PPQ. Participants were required to complete 8 program components, including personal assessments, 4 one-week-long workshops, 4 web seminars, and an action learning project (ALP) related to real-time issues submitted by PPQ ET members and staff. The final workshop was held at the University of Maryland and ended with presentation of the four teams' ALP's, which covered topics related to PPQ strategic planning and the external environment; attrition in Phytosanitary Issues Management staff; CPHST customer service; and PPQ Rapid Response Teams. The audience represented the PPQ ET, participants' supervisors, and headquarters staff.

On December 10, 2004, the 24 graduates of the L-21 Class of 2004 were awarded certificates of completion by **Dr. Ric Dunkle**.

Katie Paulson, L-21 Program Manager, is currently working with the PDC staff to revise the program based on the experience of the inaugural class and feedback from participants and instructors. Announcement of the next L-21 class will occur within the next few months. Applicants selected to participate in the Class of 2005 are expected to begin the L-21 program by early summer. I had the opportunity to participate as the only representative of CPHST as a member of Team 3. Our ALP was "Cooperation through Communication: Improving Customer Service in the USDA APHIS PPQ Center for Plant Health Science and Technology". The L-21 program was a very rewarding experience for me, both professionally and personally. Because the program is tailored specifically to PPQ, I highly recommend it for anyone with PPQ leadership aspirations.

Submitted by Leeda Wood

CPHST Scientists Temporarily Stationed at Eastern Region

January 2005

To better understand PPQ program needs, CPHST scientists (**Ken Bloem, Amy Roda** and **David Prokrym**) have recently participated in one month temporary duty (TDY) assignments at the PPQ Eastern Regional Office in Raleigh, NC. These assignments, while mutually beneficial/productive, also facilitated perspective building, as people get to know each other and learn capabilities and needs. Based on initial results, CPHST aims to continue this initiative. Complimentary needs, capabilities, and venues will be explored as workload allows.

Ken Bloem participated in the initiative from June 8 to July 9, 2004. Ken has been working for CPHST at FAMU in Tallahassee, FL to help find and implement biological control options for invasive pests entering FL from the Caribbean. On his assignment in Raleigh, he helped handle a variety of biological control issues related to imported fire ant, hemlock woolly adelgid, cereal leaf beetle and giant salvinia, and drafted a document outlining the long-term concerns, needs and budgets for biological control in the region. This experience helped him strengthen his communication links and gain a better understanding of regional program management.

Amy Roda's September stint in the Regional office came at a very fortuitous time. As current project leader for the Pink Hibiscus Mealybug (PHM) and Papaya Mealybug Off-shore initiative, Amy was prepared to develop strategies to confront the potential infestation of southern states via the shipment of PHM infested nursery stock. A lag time in discovering these infested plants has resulted in > 900,000 potentially infested plants being sold and transplanted throughout the country. The scattering of PHM infested plants in the south could result in widespread establishment of PHM. Amy drafted the ER PHM action plan. She devised three CPHST ad hoc proposals: developing a PHM risk zone map using CPHST's NAPFAST model; drafting updated PHM economic risk assessment; and requesting pesticide tests for PHM. Amy also had the opportunity to visit with **Dr. Kathy Kidd**, Biological Control Administrator at the North Carolina Department of Agriculture & Consumer Services insectary to develop ideas in improving hemlock wooly adelgid rearing techniques.

Dr. Kathleen Kidd explaining rearing techniques for the hemlock wooly adelgid

Dave Prokrym assisted **Billy Newton** (Senior Program Manager) from January 3-28, 2005. In this role, he organized and took action on high-priority biological control topics. For example, Dave participated in the PPQ WR Biological Control Steering Group meeting in teleconference mode as the group discussed the next round of canvassing and the development of a biocontrol strategic plan. He also organized and facilitated a teleconference on Tropical Soda Apple (TSA) management and moved the group closer to producing a PPQ action plan for this important weed. Dave also initiated PPQ planning on lobate lac scale and participated in a joint teleconference to discuss the adoption of the CPHST Skills & Knowledge Inventory by PPQ Regions.

Submitted by Dan Fieselmann & Laura Duffie

Inside the National Weed Management Laboratory, Fort Collins, CO

January 2005

In 1987, the Bozeman Biological Control Lab was opened on the Montana State University campus in Bozeman, Montana. The BBCL was a satellite facility of the Mission Biological Control Lab (now known as the Pest Detection, Diagnostics, and Management Lab), and was initiated to direct a PPQ effort to release and distribute biological control agents of the exotic rangeland weeds leafy spurge and spotted and diffuse knapweeds. Over time, BBCL became involved in biological control programs targeting other exotic wildland weeds, including purple loosestrife, Dalmatian toadflax, Russian knapweed, and Canada thistle.

National Weed Management Lab Staff

BBCL was involved in making field releases of permitted biocontrol agents, assessing the impact of these agents, developing agent assessment and collection protocols, rearing agents in the laboratory, greenhouse, and field cages, conducting field days and classroom sessions to train project cooperators, and working with US and international research groups to disseminate scientific information about exotic weeds and biological control. BBCL weed biocontrol projects were active in more than 30 states and eventually resulted in the distribution of tens of millions of biological control agents. BBCL personnel worked closely with other PPQ personnel and cooperators from other Federal agencies, state agencies, land-grant universities, tribal authorities, local weed and resource management groups, private land conservation groups, and Federal and provincial entities in Canada. Close collaborative relationships were maintained with CPHST laboratories in Mission, Texas and Niles, Michigan. These PPQ implementation projects represent some of the first national or regional weed biocontrol projects in the US, and some of the most successful.

Bob Richard was BBCL lab director from 1987 to 2001. In the summer of 2001, BBCL became an independent CPHST lab and **Rich Hansen** became the acting lab director. In February 2003, the Bozeman Lab was closed and remaining personnel transferred to the new National Weed Management Lab in Fort Collins, Colorado. The following is a sampling of current NWML work, which now includes GIS projects.

Historical Grasshopper Survey (Tom Kalaris & Lisa Kennaway) The Fort Collins GIS Lab is currently developing a spatial dataset of historical grasshopper survey data. PPQ has collected data on grasshopper populations across the West for over 40 years. To prevent the data from being lost, all historical surveys (in hard copy or digital form) are being collected from each state's SPHD office or from state cooperators, and then digitized into a GIS format which can be easily utilized and maintained. Copies of the data and supporting documentation (FGDC metadata, cartographic maps) will be delivered to each state, the Western Regional office, and CPHST headquarters. Once the data is complete, CPHST staff will investigate historical density patterns using a variety of spatial analysis techniques.

Saltcedar Remote Sensing Project (Tom Kalaris & Lisa Kennaway) The Fort Collins GIS lab is investigating the use of remote sensing strategies to map Saltcedar distribution and the impacts of current biocontrol efforts. The study is using hyperspectral aerial photography, satellite imagery, and a combination of existing and new software technologies. The goals of the project are to determine baseline Saltcedar distribution for two biocontrol study sites, compare several classification methodologies, and determine minimum Saltcedar cover area required for mapping.

Saltcedar images

Implementing biological control for management of saltcedars (Rich Hansen) Biological control is not yet available for management of exotic saltcedars, which are widespread riparian weeds in the western US. PPQ has developed a collaborative plan to release and distribute the first saltcedar biocontrol agent (a leaf-feeding beetle) in at least 10 states. The Fort Collins lab has developed a management plan for the release program, as well as collected and stored large numbers of the beetle for field release in 2005.

D. elongata adult on saltcedar foliage

Biological Control of Field Bindweed (Ronald Lang) Field bindweed is an aggressive perennial weed that can out compete desirable grasses and crops for moisture and nutrients. Studies in Kansas have found crop yields were reduced from 45% to 100% due to the presence of field bindweed. Two biological control agents have been released, *A. malherbe* (87,500 galls) in 5 states, CO, ID, SD, WA and WY and *T. luctuosa* (9,120) have been released in 4 states, CO, ID, WA and WY. Insectary gardens have also been established with randomly designed test plots for host specificity for bush morning glory (a native plant).

Left to right: *T. luctuosa* moth & *A. malherbe* gall

Development of Rearing Systems for Beneficial Root Feeders (Nada Tomic-Carruthers-Albany, CA) A meridic diet that supported larval development of H. transversovittatus was formulated and the fifth generation of weevils are being reared in our lab colony. Additionally, technology transfer for mass production of weevils began in 2004. In the course of the diet improvement studies, nutritional and phagostimulatory needs of larvae were addressed. Bioassay testing excluding sucrose from the diet or replacing sucrose with starch revealed the significance of sucrose for survival of 1st instar larvae. Additionally, our results indicated that the nutritional needs of larvae change as development progresses.

Submitted by Tom Kalaris

New *Ad Hoc* Database Administrator

January 2005

Saludos! Christina Lohs joined CPHST in Raleigh, NC as a Biological Science Technician for Survey Detection and Identification. Along with many other important duties, she has been brought on to the SDI team as the new Administrator of the *Ad Hoc* database.

Prior to working for CPHST, Christina earned a B.S. in Ecology and Environmental Biology from UNC-Asheville in 2000. As part of her undergraduate internship requirement, she worked as a research intern in the Entomology Department at the NC State Mountain Horticultural Crops Research and Extension Center in Fletcher, NC. In 2002, she was accepted to serve as a Peace Corps volunteer, as an Environmental Education Awareness Consultant in the Dominican Republic. Her 2 ½ years service consisted of working with the Dominican Ministry of Environment and Natural Resources promoting agroforestry practices and natural resource management to local farmers, forming a cross border reforestation initiative between the Dominican Forestry Department and Haitian border communities, and implementing efficient and sustainable forestry management plans for government and private owned properties. Some of her more accredited accomplishments during Peace Corps were learning Spanish upon her arrival, eating rice, beans, mangos and avocados daily, becoming one with the cockroaches that lived in her latrine, and learning to dance the Bachata and Merengue.

Christina moved to Raleigh/Durham, NC in August 2004 from the Dominican Republic. She is originally from Cincinnati, Ohio and lived in Asheville, NC throughout her college career. She has a passion for gardening, the NC mountains and beach, and traveling the world. She also has an open cubical policy... *cualquier cosa! Gracias.*

Submitted by Christina Lohs

A New Gatekeeper in South Florida

January 2005

Increased international trade, tourism and hurricanes greatly impact US agriculture due to the propensity of foreign products, people and storms to transport exotic invasive species into the country. Once established, an invasive species could cause millions of dollars of lost agricultural revenue and irreparable environmental damage, as well as substantial costs associated with the often futile, eradication efforts. South Florida is a particularly important area due to the high volume of agricultural imports entering in Miami. In response, CPHST has established a new position at the ARS Subtropical Horticulture Research Station in Miami to confront the constant threat of this exotic pest invasion. As of July 2004, I assumed my role as a gatekeeper and plan to help thwart the invasion both locally and abroad. In collaboration with ARS and University researchers, APHIS PPQ, local Dept. of Agriculture and APHIS PPQ IS, I oversee the off-shore initiative where integrated pest management and biological control technologies are transferred to Caribbean, South America and Pacific Island countries to suppress pest populations that would likely threaten US Agriculture.

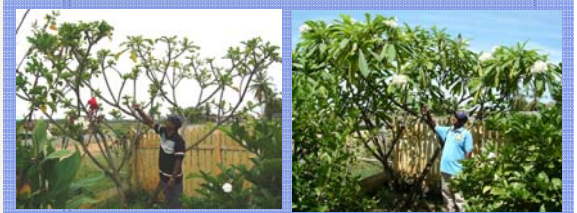
Amy Roda discussing West Indian Fruit Fly Biological Control with Barbados Ministry of Agriculture Section Manager, Ian Gibbs (Photo by John Sivinski, ARS)

Recently, a classical biological control program was successfully implemented to control the papaya mealybug in Guyana through the joint efforts of APHIS PPQ IS, CPHST and the Guyana Plant Health Unit. Within three months, mealybug populations were reduced by more than 99% due to the introduction of exotic parasitoids. These parasitoids sustained their control and spread rapidly to new infestations. The success of the mealybug off-shore initiative has resulted in new collaborative (APHIS PPQ IS, CPHST, ARS, PPQ) projects such as the biological control of the West Indian Fruit Fly, an important mango pest, in the Caribbean.

Reducing pest populations abroad helps expedite shipments and avoids unexpected pest arrivals and rejections at ports of entry, thereby slowing the spread into the US and allowing the control technology to be perfected. Recently, the spread of pink hibiscus mealybug to 33 states via infested nursery stock shows how important having a developed program is when confronting the widespread distribution of a pest. The biological control agents are available and under production. A sex pheromone has been isolated and is currently being tested as a potential detection tool. Although much work needs to be done, the catastrophic damage that this highly polyphagus pest could cause to production and trade will likely be evaded with careful planning.

Detecting pests at the border also plays a vital roll in keeping pests out of the US. In a collaborative project with SHRS ARS researchers and Miami Inspection Station, portable gas chromatography technology will be tested to detect known herbivore and pathogen specific plant volatiles elicited when attacked by a pest. With this technology, propagated material not showing the signs of disease or harboring concealed insects may be more easily detected through their volatile bouquet. Clearly, South Florida offers many opportunities to help stem the flow of invasive pests into the country.

Submitted by Amy Roda



Left: Frangipani plants prior (July 2004); Right: 3 months after release (Oct 2004) of papaya mealybug parasitoids at Goodfaith, Region 5, Guyana

CPHST Spotlight: Melinda Sullivan

January 2005

Get to know the new CPHST team members!

Melinda Sullivan joined CPHST (National Weed Management Laboratory) in Fort Collins as a Plant Pathologist in November 2004.

A native of Oklahoma, Melinda received her B.S. in Biology from The University of Tulsa in 1997. She received a M.S. in Plant Pathology from Oklahoma State University in 1999, studying the epidemiology and control of white rust of spinach. Melinda completed her doctoral studies in Plant Pathology at North Carolina State University under the guidance of Drs. H. David Shew and Thomas Melton in 2004. She studied the effects of resistance gene deployment on the race structure of *Phytophthora parasitica* var. *nicotianae*, the causal agent of black shank of tobacco. She also examined the fitness of races of the pathogen and characterized these races utilizing molecular techniques.

Melinda is married to Bill Sullivan, an anesthetist at Colorado State University Veterinary Teaching Hospital. They have two daughters, Sydney (5) and Sheridan (2). When not working, Melinda enjoys spending time with her family and traveling.

CPHST Spotlight: Craig Ramsey

January 2005

Craig Ramsey joined CPHST as an Agronomist with the National Weed Management Lab in Fort Collins, CO in August, 2004. His work in the newly formed lab involves invasive weed control with herbicides, invasive weed management, and restoration of treated sites.

Craig was born in New Milford, CT and raised on a nonworking dairy farm in a colonial house built in 1790. He has lived in Idaho, New Hampshire, Fiji, Alaska, California, Alabama, Florida, and now Colorado. He received an AS degree in forest management from Paul Smith's College in New York. His BS degree is in forest management from the University of Idaho, and his non-thesis master's degree in forest management is from Yale University in 1986. After working with a forest consultant and a forest herbicide cooperative in Auburn University he started his doctoral program in weed science at Auburn. He graduated in 2000 with an interdisciplinary degree from the Department of Agronomy and Soils and the School of Forestry and Wildlife Sciences. In 2001 he started as a post doc research associate with the University of Florida, Milton campus, where his studies focused on cogongrass control, agroforestry, longleaf restoration, and weed control for pine plantations.

Craig is married to Nazroon Ramsey and has one step son, Givan (14). After moving from the panhandle of Florida, he is eager to explore the national forests just west of Fort Collins.

Craig enjoys time with his family, hiking, traveling, and being involved with his church.

CPHST Spotlight: Keith Colpetzer

January 2005

Keith Edward Colpetzer was born in Lewistown, Pennsylvania on June 4, 1970 to William Richard and Gloria Kay Colpetzer. He married Laurel Smith at age 25, and fathered his first son, Ryan William Colpetzer, on September 25, 2002. He attended and graduated with honors from West Chester University of Pennsylvania, where he received a Bachelor of Science in Biology with an Ecology concentration. Keith was employed as a contract consultant for a small environmental firm while working on his BS, and his primary responsibility with the firm was to sample and identify aquatic macro-invertebrates in bodies of water that clients wished to relocate. Upon completion of his BS, Keith secured a position with the Plant Industry Section of the Delaware Department of Agriculture, and he worked for the Department for one year as a nursery inspector before entering a Master of Science in Entomology program at the University of Delaware. Keith successfully defended his thesis, which was an evaluation of the biological control potential of an Asian weevil against the exotic invasive weed mile-a-minute, and graduated from the University of Delaware in August 2003. Keith accepted a position at the North Carolina State University, Center for Integrated Pest Management soon after graduation. Keith became a permanent CPHST employee on August 8, 2004. He prepares commodity risk assessments for foreign governments that wish to import fruits, vegetables or ornamental plants into the United States.