CGAHR Update

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Inside this issue:

CGAHR Entomologists Win Awards

Dr. James Campbell Receives ESA Award for Excellence in Integrated Pest Management

Dr. James Campbell, Research Entomologist in the CGAHR's Stored Product Insect Research Unit (SPIRU), was selected to receive the 2013 'Award for Excellence in Integrated Pest Management' by the North Central Branch of the Entomological Society of America. This award recognizes Jim for his outstanding contributions to integrated pest management.

Congratulations, Jim!

Dr. Jim Campbell, 2013 recipient of the Excellence in IPM Award

Dr. Frank Arthur Wins Burkholder Award

Dr. Frank Arthur, Research Entomologist in the CGAHR's Stored Product Insect Research Unit (SPIRU), was selected to receive the 2013 'Wendell Burkholder Award' sponsored by Insects Limited Inc. This national award award recognizes Frank for his significant contributions to stored product entomology.

Congratulations, Frank!

Dr. Frank Arthur, 2013 recipient of the Wendell Burkholder Award.

Research Highlight

Dr. Dana Nayduch joined ABADRU in August 2011 as a Research Molecular Biologist. Dana was previously at Georgia Southern University where she was an Associate Professor in the Biology Department. For over 15 years, Dana has been working in the field of vector biology, and her main interests are understanding the molecular and microbiological interactions between arthropod vectors and the pathogens they transmit.

House flies and bacteria:

One line of research, which Dana first pursued as a graduate student at Clemson University, aims to understand the dynamic interactions between ingested bacterial pathogens and the house fly gut, and how the outcome of these interactions impacts pathogen transmission. House flies breed and thrive in bacteria-rich environments such as animal waste and refuse. As a result, flies become contaminated with, ingest, and disseminate over 65 species of human and livestock pathogens. Microbes ingested by the fly do not colonize the gut, but rather are just transient residents that are eventually expelled by regurgitation from the crop or defecation after passing through the alimentary canal (Fig. 1). Despite the ephemeral nature of this interaction, Dana's research has shown that the persistence and fate of bacteria within the fly gut is not universal across species. This disparate fate is likely a result of unique molecular and microbiological interactions between flies and bacteria, including how bacteria respond to the fly's immune response (not shown).

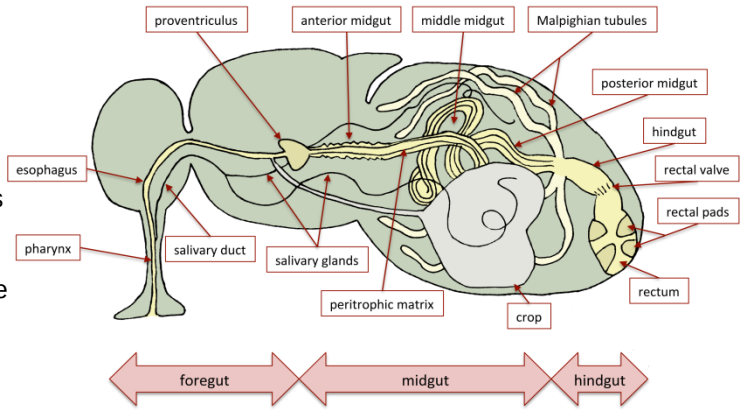

Figure 1: Bacteria ingested by house flies is first stored in liquid in the crop, from which they can be regurgitated. However, bacteria that pass through the proventriculus and enter the midgut face a hostile environment of digestive processes and antimicrobial responses. The outcome of this interaction underlies bacteria survival and therefore dissemination potential.

Dana's approach to investigating the temporospatial dynamics between microbial populations and the house fly immune response is to feed known amounts of fluorescently-tagged microbes to flies (Fig. 2), then to track their progress and survivability in the gut over time while concurrently looking at the expression of immune-responsive genes in the house fly. Her research has shown that some species, like *Staphylococcus aureus*, do very poorly in the fly gut and are rapidly excreted, while other species like *Pseudomonas aeruginosa* not only persist but proliferate in house flies and can be shed for extended periods of time (Fig. 3). Understanding factors contributing to the differential survivability of bacteria house flies can help in both assessing risk and employing proper mitigation strategies to help reduce fly-transmitted diseases.

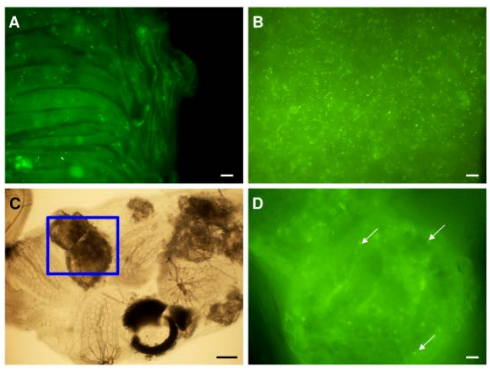

Figure 2: Bacteria expressing a fluorescent tag (green rods) facilitate visualization in the gut of the house fly: (A) Crop, (B) midgut, (C) bright field image of rectum with fecal material (D) epifluorescent image of blue boxed region in C, showing live bacteria (arrows).
Scale bar = 10 microns.

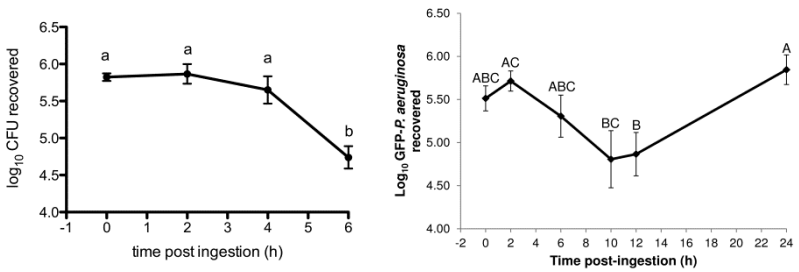

Figure 3: Species-specific differential fate of bacteria in the house fly. Left: enumeration of *S. aureus* from house flies shows rapid decline over time, with no bacteria recoverable after 12 h (not shown). Right: In contrast, *P. aeruginosa* persists and proliferates in house flies. Different letters denote statistical significance between time points (P<0.05).

For more information contact:
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Figure credits:
Fig. 2, Fig. 3 (right): Joyner, C., Mills, M.K., Nayduch, D. 2013. *PLOS ONE* (in press)

Fig. 3 (left): Nayduch, D., Cho, H., Joyner, C. 2013. *J Med Entomol*. 50: 171-8.

Meetings/Conferences

William Wilson participated in the Department of Homeland Security's National Center for Foreign Animal and Zoonotic Disease Defense (FAZD) Annual Progress Meeting in Dallas, TX, on June 26-28, 2013. The ABADRU are cooperators with two FAZD funded researchers on Rift Valley diagnostic tool development related projects and another FAZD funded researcher who has developed novel nanotrap technology discussed potential collaboration with ABADRU at this meeting. The FAZD provided full travel costs.

Mark Ruder gave an invited lecture ("Epizootic hemorrhagic disease in cattle: an overview of our current understanding") at a meeting hosted by Texas A&M University in College Station, Texas. The lecture series was part of the Texas Veterinary Medical Diagnostic Laboratory's pre-Beef Cattle Short Course Meeting for Veterinarians held on August 4, 2013. Funding for the trip was provided by Texas A&M University's Agrilife Extension Service. Airfare and lodging was contributed by Texas A&M University.

William Wilson participated as a panel member for the Research Position Evaluatation System (RPES) in Denver, Colorado, on August 13-15, 2013.

Lee Cohnstaedt, Dana Nayduch and Robert Pfannenstiel were invited to present at the Entomology Department and Veterinary School, at Oklahoma State University, September 11-13, 2013, in Stillwater, OK.

Dr. Scott McVey traveled to Shepherdstown, West Virginia, August 26 - 29, 2013 as an invited speaker to a workshop titled, "Preparing for and Responding to High Consequence and Foreign Animal Diseases (FAD) in Fish and Wildlife Workshop". This workshop, was presented by the United States Geological Survey and the Department of Homeland Security and was held at the National Conservation Training Center, in Shepherdstown.

William Wilson, was invited to give an oral presentation entitled, "One-World One Health Approaches to Arboviral Disesases" for Texas A&M in College Station, Texas, on September 16-18, 2013. Funding for this travel was provided by the Department of Veterinary Pathobiology, Texas A&M.

Dana Nayduch and Bob Pfannenstiel traveled to Austin, Texas November 9-13, 2013 to present at the Entomological Society of America annual meeting. Dana Nayduch served as Coorganizer of the MUVE Section Symposium: Cellular, Molecular and Microbiological Interactions within Hematophagous Arthropods.

Barbara Drolet traveled to Washington, D.C. to present at the 62nd annual meeting of the American Society of Tropical Medicine and Hygiene, November 13-17, 2013.

Visitors

Dr. Sayed Ahmed Hassan (Virology Chief Research Scientist), Dr. Adel Ibrahim Tanios (Microbiology Chief Research Scientist) and Dr. Hanaa Abd El-Kader Ahmed (Senior Research Scientist and Technical Manager Molecular Biology) of the Biotechnology Department at the Animal Health Research Institute, Egypt, will be in Manhattan the week of June 17, 2013 as part of a collaborative project funded by the Department of State to enhance diagnostic capabilities of eastern Africa nations. The training will focus on diagnosis of Rift Valley fever in camels using serological and molecular diagnostics. Dr. William Wilson is the project contact.

Research Highlight

The 1930s Dust Bowl prompted the USDA to establish a research program in 1947 at Manhattan, Kansas to study the basic problem of wind erosion and methods for its control. Their first attempt to model agricultural wind erosion was the Wind Erosion Equation was published in 1965. However, that model had severe limitations in adapting it to environments beyond the Great Plains and it was cumbersome to use. The National Resources Conservation Service (NRCS) requested that ARS develop the next generation of wind erosion model. The resulting Wind Erosion Prediction System (WEPS) incorporates the latest in wind erosion science and computer technology.

Fig. 1. The Dust Bowl of the 1930s resulted in the establishment of the USDA Wind Erosion Research Program in Manhattan, KS

WEPS technology allows users ranging from government agencies and researchers to universities to construction managers and individual farmers, to apply research findings to specific tracts of land to simulate and assess wind erosion soil loss and develop improved control strategies. The WEPS model, combined with a simple to use interface provides a means to input a basic field description, calculate field conditions and soil loss on a daily basis, and display outputs for designing erosion control strategies (a typical simulation is 50 yrs in <1 minute). WEPS is a complete stand-alone package allowing a simulation using simple inputs of field dimensions with the location, soil, and management selected from provided lists. Extensive databases for climate, soils, management, barriers, crop growth, and residue decomposition are included. The model calculates the hydrologic balance, soil conditions, crop growth, and residue decomposition daily to account for changes in soil loss as influenced by management and weather. The WEPS innovative modular design allows for continual model updating as new knowledge is gained through research.

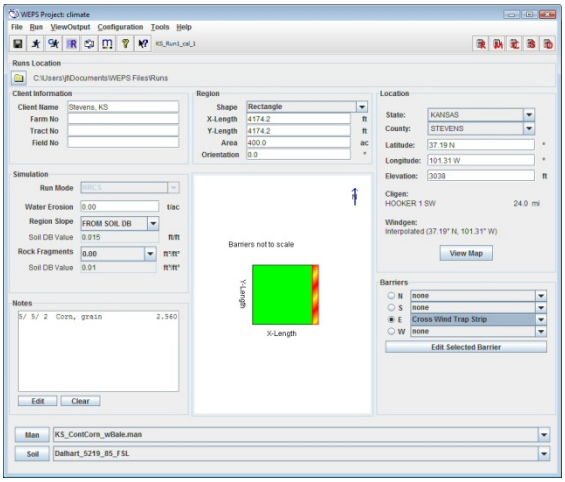


Fig. 2. Main WEPS interface screen.

One can develop conservation plans for wind erosion control using detailed WEPS outputs such as surface condition (i.e., aggregation, roughness, and vegetation), weather (i.e., windy and/or dry periods), and soil loss (i.e., amount, sizes, and direction). Such information is used to determine which periods, practices, and conditions are contributing to wind erosion. WEPS outputs also include amount of loss for each direction which aid in the placement of barriers, strip cropping, or other directional erosion control methods. By varying management inputs, the user can compare various alternatives to develop the best strategies for wind erosion control.

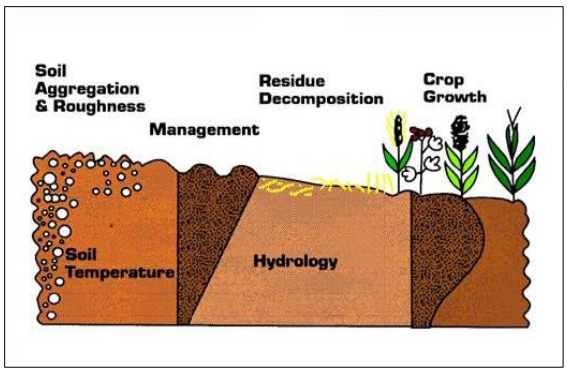


Fig. 3. Surfaces processes simulated by WEPS.

WEPS is installed on 15,000 USDA computers including those in 2,500 NRCS field offices nationwide. In addition, over 570 copies of WEPS have been downloaded by other users in 31 countries. NRCS considers WEPS essential for planning cropping systems for soil conservation and uses the model to evaluate erosion potential on 35 million acres where conservation practices are applied through conservation programs. From October, 2012 to June, 2013 alone, NRCS applied WEPS for planning cropland conservation practices on 4.7 million acres nationally with high wind erosion potential. WEPS has also been used for a variety of applications including mapping wind erosion risk in Canada, predicting dispersion of fine particulates over Mexico City, development of wind erosion control strategies for non-agricultural disturbed lands, regional GIS applications, and predicting soil loss from military training activities.

Meeting/Conferences

•AACCI meeting in Albuquerque, NM, Sept. 29 – Oct. 3, 2013. Dr. Dowell and Dr. Pearson attended until the furlough interrupted the trip.

•Tom Pearson met with representatives of Monsanto in August and October regarding his sorting technology

Awards

Larry Wagner, John Tatarko, Larry Hagen, Ed Skidmore, Fred Fox, and Simon van Donk received the 2014 FLC Award for Excellence in Technology Transfer for "Development and transfer of the Wind Erosion Prediction System."

Grants:

• Floyd Dowell: $25,000 from Vestergaard-Frandsen for "Development and Implementation of Insect-Resistant Storage Systems."
• Floyd Dowell and Frank Arthur (SPIRU): $22,200 from Stratacor for "Efficacy of C8910 to control stored product insects and fungi in grain."
• John Tatarko and Floyd Dowell: $50,000 from NRCS for "WEPS Software Support."
• John Tatarko and Floyd Dowell: $125,000 from NRCS for "Wind Erosion Science and NRCS Technology Transfer."

Visitors:

Dr. Li Hongli joined EWERU as a visiting scientist from China. Li is an associate professor at the College of Forestry, Shandong Agricultural University. She has been using the wind tunnels to study particulate matter (PM2.5) emissions that affect air quality. The results will be incorporated into our Wind Erosion Prediction System (WEPS) software.

Research Highlight

Development of a modified alveograph method to determine wheat quality in early generation lines

Rheological characteristics of wheat flour dough with explicit, nonlinear shear thinning (pseudoplastic), and thixotropic behaviors are complex and very important parameters for wheat quality evaluation and determination of end-use product quality. One of several rheological instruments is Alveograph (Fig 1), which can be used to conduct dough biaxial extension test (Fig 2) generating important dough rheological parameters, such as tenacity (P), extensibility (L or G), dough strength (W) and elasticity index (Ie) (Fig 3). A challenge that faces wheat breeding programs and some wheat-research projects is obtaining the 250 g flour required for the standard alveograph method (SAM). To meet the challenge faced by breeders for early generation lines with small wheat sample size a reliable modified alveograph method was developed at the USDA ARS Hard Winter Wheat Quality Laboratory. The modified alveograph method uses 80g of sample which is a 68% reduction in sample size compared to the SAM. The results indicated that the correlation coefficients (r) for each of six alveograph dough characteristics of 40 different advanced breeding lines and wheat varieties were 0.92 for P (mm H2O) (Fig 4), 0.73 for L (mm), 0.83 for W (10-4J) (Fig 5), 0.90 for P/L, 0.90 for Ie (%), and 0.76 for G.

Fig 1

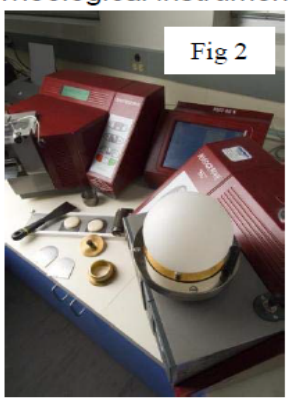


Fig 2

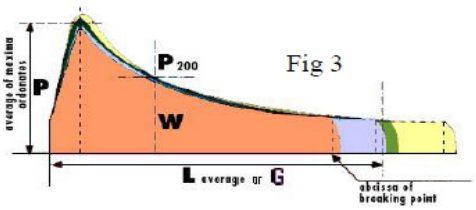


Fig 3

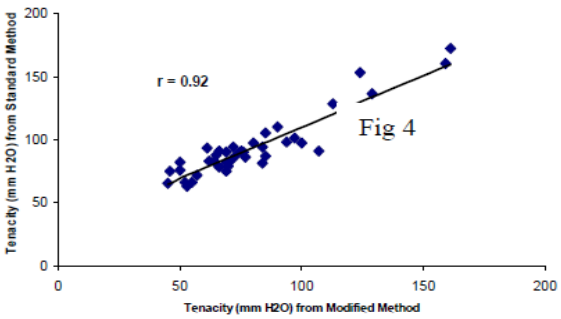
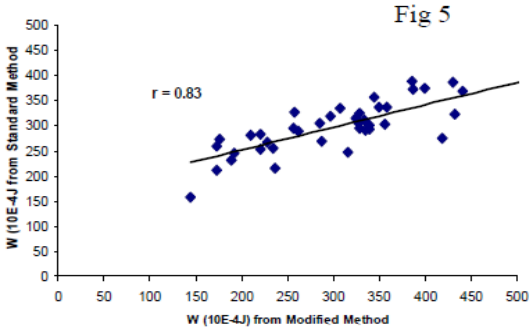


Fig 4

Fig 5



The modified alveograph method was successful in providing accurate and reproducible data as compared to SAM for measuring dough biaxial extension characteristics of a limited flour sample size. This method could be useful to wheat breeders who are interested in dough extension characteristics of early-generation breeding lines in order to effectively and efficiently select lines and develop new wheat varieties with desirable end-use product quality. The modified method may also be a good alternative to the SAM for the milling and baking industries, wheat quality labs, and other wheat research when limited flour sample size is available.

For more information contact: Dr. Richard Chen (785) 776-2750, richard.chen@ars.usda.gov

Visitors

Duncan Mackintosh, President, Bill Brake,President Sales and Marketing from Alderea Ltd, Hamilton New Zealand and Vishwanath Lingappa, Chief Technology Officer and CoCEO of Prosetta Antiviral Inc. in San Francisco visited with members of the MU on May 1st regarding the potential use of wheat and sorghum germ extracts in cell-free protein synthesis.

Drs. Yang Wenjian, Yong, Fang and Ning Ma, all professors of Food Engineering at the College of Food Science and Engineering, Nanjing University of Finance and Economics in Nanjing China visited and toured the MU on May 24th.

Brian Brown, President of Advance Water Services Inc., visited June 5th and inquired into issues regarding aflatoxin in grain.

Eleven members of the Nigerian Trade Team visited and toured the MU on June 7th. The members included Mr. Rahul Somani, Head of Commodities, Dulfil Prima Foods, Mr. Chikezie Ajaero, Financial Controller, BUA Flour Mills, Mr. Fatai Mustapha, Production System Manager, Flour Mills of Nigeria Ltd. Mr. Sunday Ogbe, A.G.M. Finance, Bendel Feeds and Flour Mills, Mr. Aderoju Ogunwole, National Sales Manager, Honeywell Flour Mills, Mr. Olayinka Shodeinde, Procurement & Supply/Head Logistics, Honeywell Superfine Flour Mills, Mr. Saurabh Merah, Vice President/Olam International, CEO Crown Flour Mills, Mr. Susanta Das, Product Technology, Dangote-Tiger Brands Milling Group, Mr. Theiva Muthu, Commercial Director, Dangote-TigerBrands Milling Group, Mr. Muyiwa Talabi, Marketing Coordinator, USW/Lagos, Mr. Gerald Theus, Assistant Regional Director-Subsahaaran Africa, USW/Cape Town.

Joe Rios, North American Director, Silva Team and Pablo Lencioni, Animal Nutritionist, discussed tannin research and toured the MU on June 13th.

Marta Lopez, Export Manager, and Arnaud Dubat, Applications and Marketing Director, Chopin Technologies, Villeneuve-la-Garenne, France toured the facility and discussed dough rheology on June 26th.

Matthew Bobertz, Sales manager, Brian Taylor, Technical Sales and Glenn Liacouras, Vice President Sales toured the facility and discussed cereal related research. on June 26th.

Four members of the South African Crop Assessment Team visited and toured the MU on July 3rd. The team members included Mrs. Tanya Erwee, Procurement Director, Premier Foods, Mr. Hugo Van Der Merwe, Trader, OLAM Trading, Mr. Luther Pretorius, Group QA Manager, Premier Foods and Ms. Domenique De Oliveria, U.S. Wheat Associates/Cape Town.

Dan Moore, Director of Operations, National Mfg Division of TMCO Inc., Lincoln NE, visited on July 31st and discussed a tortilla research project.

Dr. Harshavardhan Thippareddi, Professor university of Nebraska visited and toured the MU on August 8th.

Gene Lester, NPL for NP 306 spent two days from August 13-14th with the MU to discuss current and future CRIS projects.

Grants

Scott Bean received $6,200 from Nestle for a Material Transfer Research Agreement titled, “Analysis of Protein Subclass Composition”.

Michael Tilley received $15,000 from the Oklahoma Wheat Research Foundation for a project titled, “Early-generation Assessment of Tortilla Quality”.

Meeting/Conferences

Richard Chen attended a management/leadership workshop in Denver during May 13-17th .

Also in May, Members of the MU attended a seminar at KSU entitled “High throughput inoculation technique for resistance screening and evaluation of exotic sorghum germplasm” by Dr. Louis Prom, Sorghum Pathology, USDA-ARS College Station TX. After the seminar Dr. Prom visited the MU and discussed sorghum research with the SYs.

Tom Herald was invited to present an overview on May 15th of the GQSRU to the National Association of Retired Federal Employees (NARFE) at the Blue Hills room in Manhattan KS.

Members of the GQSRU participated in a writing workshop on July 29th presented by Nora Ransom, KSU.

Early August, MU members attended “Wheat’s on Your Mind” in which Shannon Schlecht ,Vice President on Policy with U.S. Wheat Associates presented GM wheat incident in Oregon.

Scott Bean, Prini Gadgil, Rhett Kaufman and Brian Ioerger attended the Sorghum Council of North America Conference in Lubbock TX August 27th-30th.

Research Highlight

Surprising Temperature Impacts on Hessian Fly Resistance in Wheat

The Hessian fly, *Mayetiola destructor*, is a major pest of wheat and is mainly controlled using resistant wheat cultivars. However, the host resistance strategy is overall less successful in the southern U.S. In this study, we discovered that temperature has a profound impact on Hessian fly resistance in wheat cultivars. Many wheat cultivars that are Hessian fly-resistant at 20 ºC become susceptible at higher temperatures, and many other cultivars that are fly-susceptible at 20 ºC, including popular cultivars 'Bill Brown', 'Byrd', 'Endurance', and 'Fuller', become resistant at lower temperatures. This finding is significant in several respects. First, this information is important for wheat growers to make resistant cultivar decisions according to historical temperatures in their own particular regions. Second, the loss of fly-resistance in wheat plants at higher temperatures poses a threat for future success of the host resistance strategy due to global climate change. Third, many cultivars that were classified as Hessian fly-susceptible according to standard screening criteria are actually resistant at historical average temperatures in the Great Plains area during the wheat growing season. The impact of wheat cultivars with fly-resistance at low temperatures on Hessian fly populations in the field needs to be evaluated, and may need to be taken into account in Hessian fly management.

Once the outer leaves of the wheat seedling are peeled away, Hessian fly larvae can be seen feeding near the base of a susceptible plant (larvae are about 800 micrometers long).
Photo by Peggy Greb.

•Meeting/Conferences

• Bob Bowden attended the Borlaug Global Rust Initiative (BGRI) workshop held in New Delhi India August 12-23, 2013.
• Ming-Shun Chen traveled to Washington, D.C. to participate in a NIFA Panel August 18-24, 2013.
•Jesse Poland attended the Borlaug Global Rust Initiative (BGRI) workshop held in New Delhi India August 12-23, 2013.
•Jesse Poland attended a NSF meeting that was held in Washington, D.C. September 4-6, 2013.
•Jesse Poland visited the University of North Carolina, Charlotte as an invited speaker for the Department of Bioinformatics seminar series September 12-14,2013.

Visitors

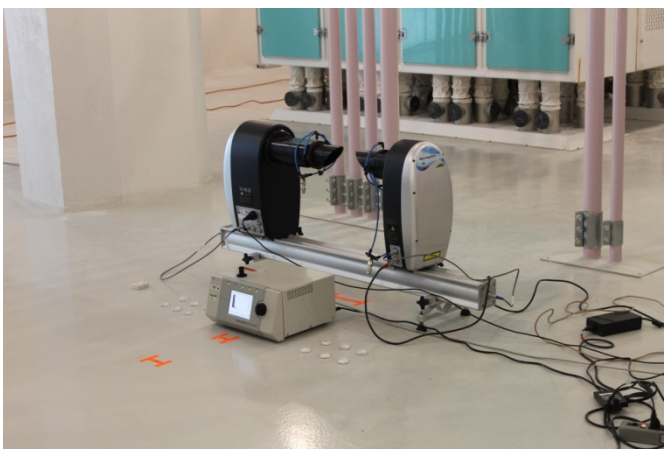
Jose Costa, our new National Program Leader visited 09/19/13.

Research Highlight

Measuring Patterns of Aerosol Insecticide Droplet Deposition in Food Facilities

Aerosol applications of reduced risk insecticides are becoming more commonly used to manage stored-product insects inside food processing facilities and warehouses. Earlier research by Stored Product Insect Research Unit scientists has shown that there is spatial variation in the effectiveness of aerosol insecticides that might be due in part to the droplet sizes produced during these applications and their dispersion through the interior of a food facility. Experiments were conducted this summer in collaboration with Kansas State University and MRI Global to measure the actual droplet concentration and droplet size distribution over time at different locations within a flour mill. Aerosol applications of two pyrethrin insecticides were evaluated and droplets measured at different distances from release and in open and obstructed areas. These findings are currently being analyzed, but should provide critical information for optimizing the effectiveness of aerosol applications and reducing the exposure time.

Jim Campbell and Frank Arthur conferring over their notes



Equipment used to measure the aerosol droplets.

Meeting/Conferences

Frank Arthur and **Jim Campbell** attended the Integrated Protection of Stored Products (IPSP) Conference of the International Organization for Biological & Integrated Control (IOBC) June 29 – July 8, 2013, in Bordeaux, France. They both presented invited keynote talks, both were on the Advisory Committee that met to plan the upcoming International Working Conference on Stored Products Protection, as well participated in an Editors meeting for the Journal of Stored Products Research. Dr. Arthur presented, "Chemical control in stored-product IPM," Dr. Campbell presented, "Recent advances and future directions in integrated stored-product insect management programs for the food industry."

Guy Hallman traveled to Fukuoka, Japan, Jul 6 – 13, 2013, as an invited guest of the Animal and Plant Health Inspection Service (APHIS) to participate on a Technical Panel on Phytosanitary Treatments at the International Plant Protection Convention (IPPC) and be involved in the evaluation of the scientific basis of proposed phytosanitary treatments to food products (fruits, nuts, durable foods) as well as the materials used in their shipment.

Guy Hallman attended the IAOM and Food Protection Committee meeting in Minneapolis, MN, Sep 10-12, 2013. This is one of the quarterly stakeholder's meeting so no talk was given.

Frank Arthur attended the Minnesota Stored Grain Pest Management Conference in St. Cloud, MN, Sep 4 – 6, 2013. He presented the invited talk, "Insect Pest Management in Stored Grain."

Frank Arthur and **Guy Hallman** traveled to the ISDA-APHIS lab at Otis Air Force Base to conduct research with **Dr. Scott Myers** to initiate a new project with the warehouse beetle and the Khapra beetle. The objectives of this project are to determine susceptibility of the warehouse beetle to different control strategies, and also determine if the two species are comparable in susceptibility. The Khapra beetle is the only stored product insect that is currently quarantined in the United States, and the APHIS lab is the only facility in the US authorized to rear the Khapra beetle. Dr. Arthur was at the APHIS location Sep 15-27, 2013. Dr. Hallman made a preliminary trip there Jul 22 – 25, 2013 and joined Dr. Arthur during the week of Sep 22, 2013.

Grants

Jim Campbell's grant with **NIFA**, through **Kansas State University** was funded. ARS is to receive $49,995 of the $500,000 awarded to continue the research related to the methyl bromide transition. This grant involves collaborators from Kansas State University, Oklahoma State University, MRI Global and many others to continue research to reduce or eliminate the need for the structural fumigation with methyl bromide to control stored-product insect pests in mills by developing improved Integrated Pest Management Programs.

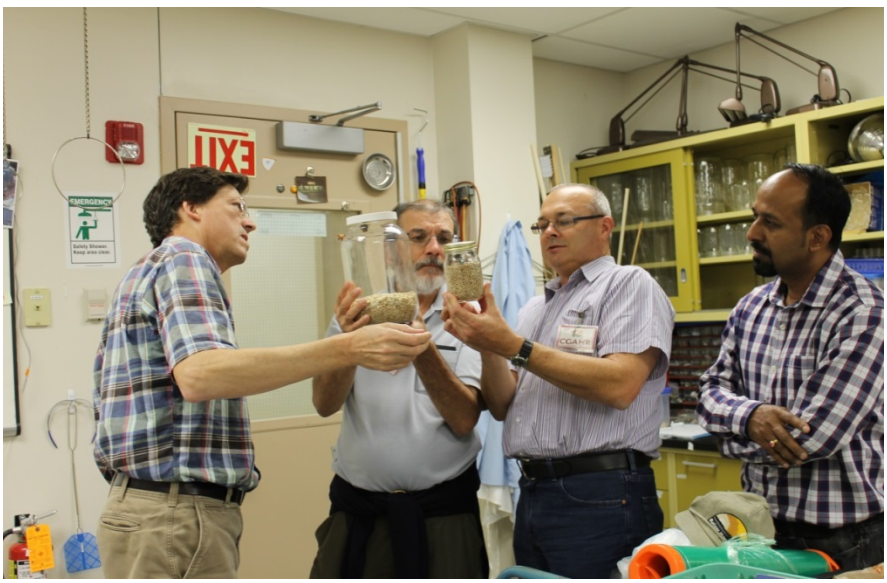
Jim Campbell's trust agreement with **TRECE** for $60,661 was funded. This project will focus on two broad areas. First is the evaluation of new trap designs and attractants to improve the monitoring of stored-product insects in food facilities. Secondly is the development and evaluation of mating disruption systems for stored-product pest insects. The goal is to improve monitoring and pest management tools for the food industry, reducing the risk of infestation and the use of toxic insecticides.

Awards

Jim Campbell was selected for the Entomological Society of America North Central Branch Award of Excellence in Integrated Pest Management, which is presented to an NCB-ESA member for outstanding contributions that are directly related to integrated pest management (IPM). The NCB award recipient will serve as the branch nominee for the Award for Excellence in Integrated Pest Management offered by the Entomological Foundation at the National meeting of the Entomological Society of America. The award was presented at the North Central Branch meeting which was held June 16-19 in Rapid City South Dakota.

Visitors

Drs. Greg Daglish, and Manoj Nayak, two stored product entomologists from the Queensland Department of Agriculture, Fisheries and Forestry, and Dr. Gimme Walter, an insect ecologist from the University of Queensland, will be visiting Dr. Tom Phillips and others at KSU next week as part of a new cooperative project. Dr. Nayak will be giving a seminar at 4PM on Monday the 13th, in the large conference room, entitled "An integrated approach to managing phosphine resistance in stored grain insects in Australia". All are invited!



Dr. Flinn showing Dr. Gimme Walter, Greg Daglish, and Manoj Nayak a parasitoid wasp *Cephalonomia tarsalis.*

Dr. Greg Daglish from the Queensland Department of Agriculture, Fisheries and Forestry will be giving a seminar on 14 May, 11:00 AM in room 129 Waters Hall, entitled "Spatial and temporal aspects of flight of *Rhyzopertha dominica* and *Tribolium castaneum* in Australia". We will likely have a couple of vehicles going over for this talk.

Dr. Timothy Smith from the U.S. Meat Animal Research Center in Clay Center, NE, visited CGAHR on Jun 18, 2013 and provided a talk titled, "Profiling immune repertoires for characterizing immune responses to infection and vaccination in cattle." Dr. Smith will meet with Dr. Brenda Oppert in SPIRU to discuss a collaborative project to use the PacBio sequencer in the project to obtain the genome sequence for the lesser grain borer, *Rhyzopertha dominica*. Dr. Smith will also meet with members of the Arthropod-Borne Animal Diseases Research Unit, as well as colleagues at Kansas State University.

Drs. Christos Athanassiou, University of Thessaly in Volos, Greece, and Nickolas Kavallieratos, of the Benaki Phytopathological Institute in Athens visited again this summer to continue their research on psocids with Frank Arthur and Jim Campbell.

EEO/Non-Discrimination Statement

USDA United States Department of Agriculture

ARS Agricultural Research Service