News from Our Industry Partners…

FOSS Technology Offers a Modern and Safe Way of Performing the Standard Falling Number Test

At this year’s NC-213 Annual Meeting/Winter Technical Sessions, meeting participants enjoyed sharing research that was presented during the technical sessions held February 18–19 in Kansas City, Missouri. Presentations given by graduate students, professors, members of industry and USDA agencies, showcasing research from the three objectives, were presented. Meeting attendees had the opportunity to interact with each other and with individuals attending the Wheat Quality Council’s Annual Meeting. This year marked the first year that NC-213 held a “Graduate Student Poster Competition—People’s Choice Award.” Twenty-five posters were on display, and members from Industry helped in the event by voting for their favorite poster. The winning posters were presented by Khairunizah Hazila Khalid, North Dakota State University, and Luis Sabillon Galeas, of University of Nebraska–Lincoln, who received an award of an Apple iPad mini. Also new this year was the opportunity for graduate students to meet with members of Industry to discuss possible internships. There were “interview tables” set up and graduate students shared their CVs with Industry. NC-213 would like to extend a special “Thank you” to Ben Handcock, President–Wheat Quality Council for his willingness to engage his Industry members in these efforts. Of significance, this year’s meeting had the highest number of registrants—52.

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Awards
Dr. Frank Arthur Wins NPA Senior Scientist Award. Dr. Frank Arthur, Research Entomologist in CGAHR’s Stored Product Insects and Engineering Research Unit at the USDA-ARS Senior Scientist Award for the Northern Plains Area. This award recognizes Frank for his sustained research productivity, impact on science and technology, and scientific leadership. Congratulations, Frank!

Meetings/Conferences
Frank Arthur was invited to speak at the 2014 Wendelbork Award Lecture at the 11th Fumigants & Pheromones Conference in Krakow, Poland, June 2–4. He made a presentation, “New grain protectant research,” and was given the 2014 Wendelbork Award. Frank Arthur attended the 2014 Methyl Bromide Alternatives Conference in Orlando, Florida, November 3–6. He presented a titled talk, “Extraneous material affects residual efficacy of cyfluthrin.”

John Dowell and Jim presented “Using meta-analysis to map the distribution of flour beetles. ” Jim presented “Using Near-Infrared Spectroscopy to Select for Resistance to FHB. ”


Frank Arthur and Jim Campbell presented “Using Near-Infrared Spectroscopy to Select for Resistance to FHB.”

The Effect of Preservation Methods on Predicting Mosquito Age by Near-Infrared Spectroscopy

Floyd E. Dowell, Alme E.M. Noucha, Kristin Michel

Abstract

The identification of insect species is not always straightforward as similar species can present a hurdle for traditional species discrimination. Fibre-optic near-infrared spectroscopy (NIRS) is a rapid and cheap method for a wide range of different applications, among them the identification of species. Despite its efficiency, NIRS has never been tested on a group of more than two cryptic species, and a working routine is still missing. Hence, we tested if specimens of four morphologically highly similar, but genetically distinct ant species can be unambiguously identified using NIRS. Furthermore, we evaluated which of the three analysis tools was most efficient in species identification. Our NIRS identification routine with partial least squares regression was successful with up to 80% of unambiguously identified specimens of a species. In detail, PLS scored best over all species (43.3% of specimens), while RF was much less effective (8.3%) and ANOVA failed completely (0%). Moreover, we showed that the one-vs-all strategy is the only acceptable option to reduce multi-class systems because of nonparametric eaprocurement of the classification procedure. We emphasized our classification routine using fibre-optic NIRS in combination with PLS and the one-vs-all strategy as a highly efficient pre-screening identification method for cryptic ant species and possibly beyond.

Interpretive Summary

The identification of insect species is not always straightforward as similar species present a hurdle for traditional species discrimination. Fibre-optic near-infrared spectroscopy (NIRS) is a rapid and cheap method for a wide range of different applications, among them the identification of species. Despite its efficiency, NIRS has never been tested on a group of more than two species, and a working routine is still missing. Hence, we tested if specimens of the four morphologically highly similar, but genetically distinct ant species can be identified using NIRS. Furthermore, we evaluated which of three analysis tools was most efficient in species identification. Our NIRS identification routine with partial least squares regression was successful with up to 80% of identified specimens correctly classified. We emphasize our classification routine using fibre-optic NIRS was a highly efficient pre-screening identification method for similar ant species.

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International Calendar of Events


May 7–14 • “Snacks Technology Conference—Recent developments.” — Canterbury, UK. Contact: Daphne Llewellyn Davies. Campden BRI. Tel: +44 (0)1235 822 373, Fax: +44 (0)1235 822 337, Email: daphne.llewellyn-davies@campdenbri.co.uk, Web: www.campdenbri.co.uk.


May 15–16 • “38th Annual Purchasing Seminar.” — Sheraton Hotel Kansas City. Kansas City, Missouri, USA. Contact: Christine Sullivan, SOSLand, +1 (816) 756 1000/871, Email: csullivan@sosland.com, Web: www.purchasingseminar.com.


June 4–7 • “34th A.I.B.I. Congress.” — Athens, Greece. Contact: Mrs. Susanne Döring, Secretary General. AIBI—International Association of Plant Bakers—aisbl. Grand Place 10, B-1000 Brussels, Belgium. Tel: +32 (2) 721 41 00, Fax: +32 (2) 721 41 01, Email: aisbl@aisbl.org, Web: www.aisbl.org.


July 5–7 • “Joint ECOSTACE Conference at the World Expo Milan 2015. Grains for Feeding the World.” — Milan, Italy. Contact: ICC—International Association of Cereal Science and Technology. General Secretary, Manexargia 2-A 1000, Vienna, Austria. Tel: +43 1 707 7200, Fax: +43 1 707 7208, Email: office@icc.ac.at, Web: www.icc.ac.at, Email: office@icc.int, Web: www.icc-int.org.

July 17–18 • “Institute of Food Technologists Megatrends and Meeting Expo.” — Chicago, Illinois, USA. Contact: JPT. 211 N. LaSalle St, Suite 300, Chicago, IL 60601–3411, USA. Tel: +1 (312) 792 8454, Fax: +1 (312) 792 0445, Email: info@ift.org, Web: www.ift.org.

August 6–8 • “3rd International Grain Quality and Food Security Conference.” — Manhattan, Kansas, USA. Contact: Kingsly Ambrose. Kansas State University, Department of Grain Science and Technology. Manhattan, KS 66506, USA. Tel: +1 (785) 532 5088, Email: kingsly@ksu.edu, Web: www.ksre.ksu.edu/news/story/food_symposium042514.aspx

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techniques require dissection or biochemical extraction. Near-infrared spectroscopy has been used to rapidly and nondestructively determine the age of fresh mosquitoes, but the requirement for fresh insects limits applications of this technique. Thus, in this study, we investigate whether age can be predicted from preserved insects. Results from this study show that age can be predicted from mosquitoes preserved with desiccants, ethanol, Carnoy, RNAalot, or refrigeration with confidence intervals less than 1.4 days. The best results were obtained from mosquitoes stored using desiccants, RNAalot, or refrigeration.

Interpretive Summary
Malaria affects about 300 million people per year, primarily in developing countries. Mosquitoes must be about 8 days old to transmit malaria, thus it is important to determine the age structure of mosquito populations in order to determine the effectiveness of disease control programs. Current age grading techniques require tedious dissections or biochemical extraction. We developed a rapid technique using near-infrared spectroscopy to determine the age of fresh mosquitoes, but the requirement for fresh insects limits applications of this technique. Thus, in this study, we investigate whether age can be predicted from preserved insects. Results from this study show that age can be predicted from mosquitoes preserved with desiccants, ethanol, Carnoy, RNAalot, or refrigeration with confidence intervals less than 1.4 days. The best results were obtained from mosquitoes stored using desiccants, RNAalot, or refrigeration.

Wheat Mill Stream Properties for Discrete Element Method Modeling
Authors: A. Patwa, R. P. Kingly Ambrose, H. Dogan, and M. E. Casada
Journal: Transactions of the ASABE

Abstract
A discrete phase approach based on individual wheat kernel characteristics is needed to overcome the limitations of previous statistical models and accurately predict the milling behavior of wheat. As a first step to develop a discrete element method (DEM) model for the wheat milling process, this study determined the physical and mechanical properties of wheat mill streams (wheat kernels, break stream, and wheat flour) that are required as input parameters for a discrete element method (DEM) model for the wheat milling process and determined the effect of moisture content (from 12 to 16% wet basis) on these properties. Moisture content had a greater effect on physical and mechanical properties of wheat mill streams (wheat kernels, break stream, and wheat flour) that are required as input parameters for a discrete element method (DEM) model for the wheat milling process and determined the effect of moisture content (from 12 to 16% wet basis) on these properties. Moisture content had a greater effect on physical and mechanical properties (bulk, true, and tapped densities and particle size) of the mill streams than it did on the mechanical properties (Young’s modulus, coefficients of static and rolling friction, and coefficient of restitution). These property values can now be incorporated into a DEM model of the milling process that will help flour millers to more easily and consistently produce high-quality flour.

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AMTek Microwaves Lends Equipment for Research in Rice Drying, Processing

Fast Facts:
• Researchers to test benefits of rapid drying of rice in three-year study.
• Potential exists for one-pass rice drying, reduced moisture content gradients within individual rice kernels during drying and preventing cracking of rice kernels to maintain quality during milling.

FAYETTEVILLE, Arkansas, USA—Bringing in a microwave to dry harvested rice could do more than just get the job done faster. Researchers at the University of Arkansas System Division of Agriculture seek to use it to prevent cracking of dried rice kernels and maintain milling quality. The Food Science Department is working with equipment on loan from AMTek Microwaves of Cedar Rapids, Iowa, to determine the capabilities. “This is new for rice, especially for drying rice,” said Griffiths Atungulu, an assistant professor of grain processing and engineering in the department who is leading the research effort. “Traditionally, rice has been dried in the United States using natural air in-bin, and heated-air, high-temperature cross-flow drying systems. The microwave is another potential new technology. We are working with AMTek to see how we can optimize the new technology to maintain quality of the dried rice.”

Atungulu sees considerable potential for microwave drying and the benefits it can offer in rice processing. Microwave dryers use volumetric heating—heating the entire kernel nearly all at once—that may allow for rapid drying. The volumetric heating of rice accorded by microwaves reduces chances of high moisture content gradients developing in the rice kernels, which in turn reduces the likelihood of kernels cracking from stress. When such cracking is prevented, the kernels are less susceptible to breakage during milling. Breakage can reduce the rice milling yield, which has a negative economic impact for rice producers and processors.

“One of the things we look for is to dry rice quickly, but in ways that maintain rice quality in terms of milling, nutrition, sensory and functionality,” Atungulu said. “Rice milling quality is very sensitive to moisture content and temperature gradients encountered during drying. This particular equipment is designed with modular processing features, which we hope to optimize with an optimal goal that rice could be dried to safe storage moisture content in a single pass and not introduce huge moisture content gradients that might produce fissions or cracking.”

Atungulu also sees some potential for using the technology to achieve not only drying but also disinfection and decontamination of any insects that may be deleterious to rice quality during storage.

The research project being pursued by Division researchers would be on a pilot-scale using the AMTek microwave and other facilities on campus. The results could be applicable on a larger industrial scale. Atungulu said that it is important to experiment with various bed-layer thicknesses on the conveyor belt to determine drying characteristics. The microwave energy supplied to mass amounts of rice such as would be the case in a scaled-up process should take into account the thickness of the rice bed and initial moisture content.

“At some of the parameters we need to define very carefully,” Atungulu said. “What is that optimal bed thickness? What intensity of heat does the microwave correspond to that will give us desired drying duration and product quality for rice at a given initial moisture content? Those must be determined before anyone can begin thinking about scaling up for industry.”

The research team expects to work on the project while testing different cultivars of rice and at different seasons. The company’s equipment is on loan throughout that process, said Stephen Rogers, AMTek vice president. AMTek joined with the Division of Agriculture after the company was asked by a foreign nation to develop a rice drying machine, Rogers explained. He said AMTek personnel weren’t familiar with rice drying techniques, but then they discovered papers on the topic written by Atungulu and Terry Siebenmorgen, director of the Division’s Rice Processing Program.

“So we contacted them and have been working to establish this relationship to have them help us figure out how to dry rice using microwaves,” Rogers said. “The project is expected to take three years.

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