

# Grain Quality Newsletter

News and Highlights from NC-213: Marketing and Delivery of Quality Grains and BioProcess Coproducts.

Volume 35:1

NC-213 The U.S. Quality Grains Research Consortium

## International Calendar of Events

- **April 15–17:** “14th European Young Cereal Scientists and Technologists Workshop.” Copenhagen, Denmark. Contact: Email: cerealsandeuropa@scisoc.org, Web: www.aaccnet.org/membership/sections/CerealsandEurope/EYCSTW/Pages/14thEYSTW.aspx
- **April 22–24:** “Modern Bakery Moscow 2015. 21st International Trade Fair for Bakery and Confectionery.” Expocentre Fairgrounds. Moscow, Russia. Contact: OWP, Ost-West Partner GmbH. Tel: +49 (0) 911 50711-140, Fax: +49 (0) 911 50711-240, Email: info@modernbakery-moscow.com, Web: www.modernbakery-moscow.com
- **April 22–26:** “3. International Poultry Meat Congress.” Starlight Convention Center & Sunrise Park Resort. Antalya, Turkey. Contact: BESD-BIR, Poultry Meat Producers & Breeders Association. Çetin Emeç Bulvarı, 1314. Cadde, 1309. Sokak No: 5/A Öveçler, Ankara, Turkey. Tel: +90 (312) 472 7788, Fax: +90 (312) 472 7789, Email: besd-bir@besd-bir.org, congress@poultrymeatcongress.com, Web: www.besd-bir.org, http://poultrymeatcongress.com/invitation.php, www.beyazetkongresi.com
- **April 23–26:** “6th International Flour, Semolina, Rice, Corn, Bulgur, Feed Milling Machinery and Pulse, Pasta, Biscuit Technologies Exhibition.” Tüyap Fair Convention and Congress Center. Büyükdere, Istanbul, Turkey. Contact: PARANTEZ Uluslararası Fuar Yapım Tic. Ltd. Şti. Hadimköy Kavşağı, Atatürk Mahallesi, 531. Sok. Ginza Corner Plaza, No: 16/37 Kıracı, Esenyurt, Istanbul, Turkey. Tel: +90 (212) 347 3164 (Pbx), Fax: +90 (212) 212 0204, Email: info@idma.com.tr, Web: www.idma.com.tr
- **April 27–29:** “5th C&E Spring Meeting: Celebrating Cereals in the AACC International Centennial Year!” Budapest, Hungary. Contact: Eugénie Pereira, C&E Spring Meeting Secretariat. Avenue de Tervuren 300 Brussels B-1150, Belgium. Email: cerealsandeuropa@scisoc.org, Web: www.cespringmeeting2015.org/
- **April 27–29:** “Fi Russia 2015 & Hi, Food ingredients Russia 2015 & Health ingredients.” Moscow, Russia. Contact: UBM EMEA. Tel: +31 (0) 20 40 99 503, Fax: +31 (0) 20 36 32 616 Email: evelien.feijen@ubm.com, Web: www.figlobal.com, www.figlobal.com/russia
- **May 4–8:** “119th IAOM, International Association of Operative Millers, Annual Conference & Expo.” Renaissance Palm Springs Hotel and Palm Springs Convention Center. Palm Springs, California, USA. Contact: Ms. Shannon Henson, Director of Meetings and Exhibits. IAOM, International Association of Operative Millers. 12351 W. 96th Terrace, Suite 100 Lenexa, Kansas 66215 USA. Tel: +1 (913) 338 3377, Fax: +1 (913) 338 3553, Email: shannon.henson@iaom.info, info@iaom.info, Web: www.iaom.info

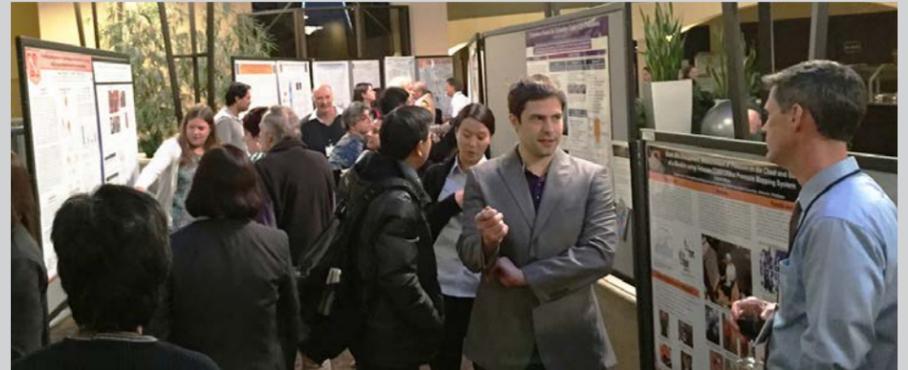
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## NC-213 Annual Meeting in Review

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.



*Poster competition winners*



*Poster competition*

## News From Our Industry Partners...

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

FOSS announces Alphatec™ FN<sup>®</sup>, a modern and safe way to perform the standard falling number test used to check sprouting damage in grain and enzyme-activity in flour before baking, malting, etc.

Alphatec FN<sup>®</sup> offers a new alternative for testing the standard AACC Method AACC 56-81B “Determination of Falling Number” with features including a specially designed cooling lid that minimizes the rush of steam when loading samples and a touch screen interface for easy operation.

#### A safe way to test falling number

Little has changed with existing equipment for falling number for decades. Based on extensive FOSS experience with automation of laboratory analysis, the Alphatec FN<sup>®</sup> includes a number of developments. A specially designed cooling lid minimizes the rush of steam when loading samples, helping to avoid potential injury. A fully insulated sample bath avoids hot surfaces and reduces risk of inadvertent burns. An overflow directly into waste stops hot water spillage on the bench or near the work area.

#### Touch screen usability

A modern touch screen interface makes it easier to use. This can reduce training costs by allowing rapid, error-free use by anyone. The practical design has a detachable rack for tubes and other accessories and rear water connectors to ensure the working area is clear.

As part of the extensive FOSS portfolio, the Alphatec FN<sup>®</sup> offers a unique level of customer support for smooth and uninterrupted analytical operations. FOSS is a respected supplier with a proven track record of 11,000 installed grain analysis instruments worldwide.

#### Following the standard method

The standard AACC Method AACC 56-81B “Determination of Falling Number” Falling Number is an important test for measuring the soundness of traded grain. The test is based on the alpha-amylase enzyme activity in grains. This helps to spot sprouting damage and is vital for improved control of flour enzyme activity for the final quality of bread, pasta, noodles and malt.

Learn more: <http://www.foss.us/news/news-overview/20141001-three-new-solutions>



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Send your contributions, comments, suggestions, and subscription requests to:

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Visit the NC-213 website at: [nc213.org](http://nc213.org)



## Latest News from (the) Center for Grain and Animal Health Research, Manhattan, Kansas

### Awards

**Dr. Frank Arthur Wins NPA Senior Scientist Award.** Dr. Frank Arthur, Research Entomologist in CGAHR's Stored Product Insects and Engineering Research Unit, received the 2014 "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 Wendell Burkholder 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 Wendell Burkholder Award.

**Frank Arthur** attended the 2014 Methyl Bromide Alternatives Conference in Orlando, Florida, November 3–6. He presented a talk titled, "Extraneous material affects residual efficacy of cyfluthrin."

**Frank Arthur, Jim Campbell, John Diaz** and **Erick Goes** attended the 2014 ESA meeting in Portland, Oregon, November 15–19. All presented a talk or a poster at this meeting. Frank presented, "Protective packaging and stored product insects: Safeguarding the food supply"; Jim presented, "Developing mating disruption programs for Indianmeal moth in retail stores"; John presented, "Distribution of psocids in different moisture gradients in wheat"; and Erick, a KSU Grad Student, presented a poster titled, "Vertical movement of *Rhyzopertha dominica* (Coleoptera: Bostrichidae), the lesser grain borer, in the grain mass: Factors affecting dispersal behavior."

**Frank Arthur** and **Jim Campbell** attended the 11th International Working Conference on Stored Product Protection (IWCSPP) in Chiang Mai, Thailand, November 24–28. Frank presented "Trogoderma variable: A model species for control of Dermestids in museums," and "Aerosol efficacy and direct and indirect exposure of flour beetles." Jim presented "Using meta-analysis to analyze data from multiple flour mill studies."

**Floyd Dowell** attended the American Association of Cereal Chemists International Annual Meeting in Providence, Rhode Island, October 5–8. Floyd serves on the Spectroscopic Methods technical committee for AACCI.

**Floyd Dowell** attended the U.S. Wheat and Barley Scab Initiative's National Fusarium Head Blight Forum in St. Louis, Missouri, December 7–9. He presented "Using Near-Infrared Spectroscopy to Select for Resistance to FHB."

### A Near-Infrared Spectroscopy Routine for Unambiguous Identification of Cryptic Ant Species

Martin-Carl Kinzner<sup>1\*</sup>, Herbert C. Wagner<sup>1</sup>, Andrea Peskoller<sup>1</sup>, Karl Moder<sup>2</sup>, Floyd E. Dowell<sup>3</sup>, Wolfgang Arthofer<sup>1</sup>, Birgit C. Schlick-Steiner<sup>1†</sup>, Florian M. Steiner<sup>1†</sup>

<sup>1</sup>Molecular Ecology Group, Institute of Ecology, University of Innsbruck, Innsbruck, Austria

<sup>2</sup>Institute of Applied Statistics and Computing, University of Natural Resources and Life Sciences, Vienna, Austria

<sup>3</sup>Agricultural Research Service, United States Department of Agriculture, Manhattan, Kansas, United States of America

#### Abstract

The identification of species—of importance for most biological disciplines—is not always straightforward as cryptic 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 cryptic species, and a working routine is still missing. Hence, we tested if specimens of the four morphologically highly similar, but genetically distinct ant species *Tetramorium alpestre*, *T. caespitum*, *T. impurum*, and *T. sp. B*, all four co-occurring above 1300 m a.s.l. in the Alps, can be unambiguously identified using NIRS. Furthermore, we evaluated which of the three analysis tools, partial least squares regression (PLS), artificial neural networks (ANN), and random forests (RF), is most efficient in species identification. We opted for a 100% classification certainty, i.e., a residual risk of misidentification of zero within the available data, at the cost of excluding specimens from identification. Additionally, we examined which strategy, one-vs-all, i.e., one species compared to the pooled set of the remaining species, or binary-decision strategies, is best to reduce a multi-class system to a 2-class system, as is necessary for PLS. Our NIRS identification routine, based on a 100% identification certainty, 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 ANN failed completely (0%). Moreover, we showed that the one-vs-all strategy is the only acceptable option to reduce multi-class systems because of a minimum expenditure of time. We emphasize 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.

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

Floyd E. Dowell, Aline E.M. Noutcha, Kristin Michel

Engineering and Wind Erosion Research Unit, Center for Grain and Animal Health Research, U.S. Department of Agriculture, Agriculture Research Service, Manhattan, Kansas; Department of Animal and Environmental Biology, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria; Division of Biology, Kansas State University, Manhattan, Kansas

#### Abstract

Determining mosquito age is important to evaluate vector control programs because the ability to transmit diseases is age-dependent. Current age-grading

*Continued on next page*

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#### International Calendar of Events

- **May 7–8:** "5. Food Safety Congress." Military Museum. Istanbul, Turkey. Contact: Congress Secretariat, Muhter Ersin, Food Safety Association. Hasan Amir Sok. Dursoy İş Merkezi No: 4 Kat 4 D: 10, 34724 Kızıltoprak, Istanbul, Turkey. Tel: +90 (216) 550 0223 - 550 02 73, Fax: +90 (216) 550 0274, Email: muhter.ersin@ggd.org.tr, ggd@ggd.org.tr, Web: www.ggd.org.tr, www.gidaguenligikongresi.org
- **May 13–14:** "Snacks Technology Conference: Recent developments." Chipping Campden, UK. Contact: Daphne Llewellyn Davies. Campden BRI. Tel: +44(0)1386 842040 (Direct), Email: daphne.davies@campdenbri.co.uk, Web: www.campdenbri.co.uk
- **May 13–15:** "Food Ingredients Istanbul 2015." Istanbul Congress Center, ICC. Istanbul, Turkey. Contact: UBM Istanbul. Tel: +90 (216) 693 3200, Fax: +90 (216) 693 3202, Email: ozgur.kayihan@ubm.com, Web: www.figlobal.com/istanbul/home, www.foodingredientsglobal.com
- **May 27–28:** "The 6th edition of Milling Industry Expo and Conference held at Moroccan Milling Training Institute (IFIM)." Casablanca, Morocco. Contact: Mrs. Soumaya Esseddiki, Communication Responsible. Moroccan Federation of Millers. Tel: +212 522 30 18 01 / +212 522 30 73 23 Email: fnm@

fnm.org.ma, Web: www.fnm.org.ma

- **May 31–June 2:** "38th Annual Purchasing Seminar." Sheraton Hotel Kansas City. Kansas City, Missouri, USA. Contact: Christina Sullivan. Milling & Baking News, Food Business News. Tel: +1 (816) 756 1000/871, Email: csullivan@sosland.com, Web: www.purchasingseminar.com
- **June 1–3:** "6th International Dietary Fibre Conference 2015, DF 2015." Paris, France. Contact: ICC—International Association for Cereal Science and Technology. General Secretariat. Marxergasse 2 A–1030 Vienna, Austria. Tel: +43 1 707 72020, Fax: +43 1 707 72040, Email: office@icc.or.at, Web: www.icc.or.at/events/df09/index.php, www.icc.or.at/DF2012-Announcement.pdf
- **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: 0032-2-361 1900, Fax: 0032-2-381 1800, Email: sd@aibi.eu, Web: www.aibi.eu
- **June 9:** "The International Grains Council, IGC 2015 Grains Conference." Grosvenor House Hotel. London, England. Contact: IGC Secretariat, International Grains Council. 1 Canada Square, Canary Wharf, London E14 5AE England. Tel: +44 20 7513 1122, Fax: +44 20 7513 0630, Email: conf@igc.int, igc@igc.int, Web: www.igc.int/en/conference/confhome.aspx
- **June 9–11:** "FIAAP International, VICTAM International & GRAPAS International." Cologne Exhibition Halls (Koelnmesse). Cologne, Germany. Contact: Victam International BV. Email: Expo@victam.com, Web: www.victam.com
- **June 10–11:** "SNACKEX 2015, XVI. International Exhibition & Conference for Savoury Snacks and Nuts." Istanbul Congress Centre, ICC. Istanbul, Turkey. Contact: European Snacks Association. 6 Catherine Street, London, WC2B 5JJ United Kingdom. Tel: +44 20 7420 7220, Fax: +44 20 7420 7221 Email: esa@esasnacks.eu, Web: www.snackex.com
- **June 24–27:** "Whole Grain Summit 2015." The Nines Hotel. Portland, Oregon, USA. Contact: OSU Conference Services. 200 LaSells Stewart Center, Corvallis OR 97331, USA. Tel: +1 (541) 737 9300, Email: conferences@oregonstate.edu, Web: http://wholegrainsummit2015.com/
- **July 1–3:** "Joint ICC/AISTEC Conference at the World Expo Milan 2015: Grains for Feeding the World." Milan, Italy. Contact: ICC—International Association for Cereal Science and Technology.

General Secretariat. Marxergasse 2 A–1030 Vienna, Austria. Tel: +43 1 707 72020, Fax: +43 1 707 72040, Email: office@icc.or.at, Web: www.icc.or.at, http://expo2015.icc.or.at/

- **July 11–14:** "Institute of Food Technologists Annual Meeting and Food Expo." Chicago, Illinois, USA. Contact: IFT. 221 N. LaSalle St. Suite 300, Chicago, IL 60601–1291, USA. Tel: +1 (312) 782 8424, Fax: +1 (312) 782 0045, Email: info@ift.org, Web: www.ift.org
- **August 3–6:** "International Grain Quality and Food Security Conference." Manhattan, Kansas, USA. Contact: Kingsly Ambrose. Kansas State University, Department of Grain Science and Industry, Manhattan, KS, 66506, USA. Tel: +1 (785) 532-4091, Email: kingsly@ksu.edu, Web: www.ksre.ksu.edu/news/story/food\_symposium042514.aspx

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## Latest News from (the) Center for Grain and Animal Health Research, Manhattan, Kansas

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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, RNAlater, or refrigeration with confidence intervals less than 1.4 days. The best results were obtained from mosquitoes stored using desiccants, RNAlater, 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, RNAlater, or refrigeration with confidence intervals less than 1.4 days. The best results were obtained from mosquitoes stored using desiccants, RNAlater, or refrigeration.

### Wheat Mill Stream Properties for Discrete Element Method Modeling

*Authors: A. Patwa, R. P. Kingsly Ambrose, H. Dogan, M. Casada*

*Journal: Transactions of the ASABE*

*Citation: Patwa, A., R.P. Kingsly Ambrose, H. Dogan, and M. E. Casada. 2014. Wheat mill stream properties for discrete element method modeling. Transactions of the ASABE Vol. 57(3): 891–899.*

### 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) required as input parameters. The parameters measured were particle size and size distribution, bulk density, Young's modulus, static and rolling coefficients of friction, and coefficient of restitution. The effect of moisture content (12% to 16% wet basis) on these properties was evaluated. The density, Young's modulus, and coefficient of restitution tended to decrease while the coefficients of friction tended to increase with increasing moisture content of wheat kernels. The effect of moisture content on material properties was significant for break stream, but there was no significant ( $p > 0.05$ ) material property change with moisture content for flour. It was concluded that moisture content had a greater significant effect on physical 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).

### Interpretive Summary

Monitoring all variables during wheat milling would be very challenging, but models are an effective substitute for physically monitoring these variables. Models save time and reduce the effort required to control each variable independently; however, previous statistical models were limited and an accurate model of individual particle behavior during the milling process is needed. We measured 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 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 fissures or cracking."

Atungulu also sees some potential for using the technology to achieve not only drying but also disinfestation 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.

"Those are 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.

*Contact: Dave Edmark, Division of Agriculture Communications, 479-575-6940, dedmark@uark.edu*

*January 30, 2015*