

Grain Quality Newsletter

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

Volume 38:2

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

NC-213 Annual Meeting/Technical Sessions/Poster Showing 2019 – Please Mark Your Calendar!

The NC-213 Annual Meeting/Technical Sessions/Poster Showing with Full-time Student Poster Competition will be held **February 26-27, 2019** in Ames, Iowa. The meeting will be held at Gateway Hotel & Conference Center at Iowa State University. Meetings and lodging will be at the Gateway Hotel. NC-213 Objective Co-Chair-Gretchen Mosher, Iowa State University, is orchestrating the 2019 Meeting and more details will follow. Here is the draft Program Agenda:

2/26/19: 8:00AM – 11:30AM Tour of ISU facilities (more information to be provided).

2/26/19: 12Noon – Optional Boxed Lunch for meeting participants.

2/26/19: 1:00PM – NC-213 Annual Meeting 2019 begins.

2/26/19: 4:00PM - Poster Showing/Full-time Student Poster Competition will begin. Two drink tickets will be given to all in attendance for beer or wine. Cash bar to be available along with appetizers.

2/26/19: 6:30PM Poster Showing to close. Group dinners/On Your Own dinner time.

2/27/19: 8:00AM Annual Meeting 2019 resumes.

2/27/19: 12Noon. Buffet lunch with awards and business meeting.

2/27/19: 3:00PM. Meeting Adjourns.

Different this year, NC-213 Chair Anton Bekkerman, Montana State University, is changing the layout of the Program to reflect how Technical Sessions were presented in the past. Presentations that fall under Objective 1 will be scheduled first. We have nine presentations slots available. Next, presentations that fall under Objective 2 will be scheduled. We have eight presentation slots available. Last, presentations that fall under Objective 3 will be scheduled and we have five slots available. These “pre populated” slots are based on an average of presentation slots over the past few years. Also, Objective Co-Chairs who are in attendance will be asked to facilitate their Objective presentation sessions.

Please look for updates on the NC-213 Annual Meeting 2019.



Photo credit: Anderson Institute. What's New in Grain Elevators. What's New in Grain Elevators. Photo courtesy of The Anderson Institute. Copyright 2018.

The Andersons Research Grant Program:
Team Competition

Request for Proposals

Submission Deadline:
Friday, September 14, 2018
(See the 2018 Request for Proposals)

NC-213: Marketing and Delivery of Quality Grains and BioProducts Coproducts

The Andersons Research Grant Program – Team Competition 2018 Request for Proposals Released!

In June 2018, the NC-213 Administrative Advisor's Office released the Request for Proposals (RFP) for The Andersons Research Grant Program – Team Competition 2018. The goal of The Andersons Research Grant Program - Team Competition is to develop new approaches and technologies to maintain or improve the quality of cereals and oilseeds from harvest to end use, while preserving the environment, and maintaining consumer safety. These approaches and technologies must be developed and implemented if the U.S. is to remain at the forefront of the world's major producers. This program is focused on facilitating multidisciplinary, multistate, and multiagency collaborative research to address critical cereals and oilseed research issues.

USGC Receives USDA Grant For Feed Manufacturing Training Center In North Africa

(Sent on Behalf of Charlie Hurburgh, Iowa State University)

The U.S. Department of Agriculture (USDA) has awarded the U.S. Grains Council (USGC) a grant for \$1.3 million for the Regional Center for Feed Manufacturing for North Africa and the Middle East, to be headquartered in Tunisia.

“U.S. feed grain suppliers are facing increasing competition in the North African and Middle Eastern grain markets,” said Ramy Taieb, USGC regional director for the Middle East and North Africa. “As a result, the Council’s work in Tunisia is becoming more strategic, focusing on how to utilize training programs to help develop both the Tunisian feed industry as well as regional feed industry, while emphasizing the advantages of U.S. coarse grains and co-products.”

USDA Under Secretary for Trade and Foreign Agricultural Affairs Ted McKinney announced the grant last week during the Council’s 15th International Marketing Conference and 58th Annual Membership Meeting in Houston, Texas.

The USDA grant follows an initial grant from the U.S. State Department, which led to the January signing of a memorandum of understanding between the Council, the National Institute of Agronomy of Tunisia (INAT) and Iowa State University. Together, the organizations will establish a regional center to provide training for feed production and improved animal nutrition across all sectors of the feed industry.

The initial program will train a core team of 10 to 20 industry professionals, targeting nutritionists, feed millers and poultry, dairy, beef and aquaculture producers. This first team will later return to the Center for Feed Manufacturing to subsequently train 80 to 100 members of the next generation of feed industry leaders in Tunisia. The program will include intensive and extensive technical curriculum as well as activities meant to foster development and professionalism within the industry.

“Interest in this program is high as the feed industry continues to grow in Tunisia,” Taieb said. “With this training, we expect U.S. coarse grains and co-products to have a positive impact both in terms of U.S. exports and for cost, production and feed quality for the region.”

Longer-term, the Council expects to expand these training opportunities to feed industry professionals throughout the Middle East and Africa, which will boost compound feed production and stimulate demand for U.S. corn, barley, sorghum and co-products.

USGC Signs Memorandum Of Understanding To Establish Tunisian Center For Feed Manufacturing

(Sent on Behalf of Charles Hurburgh, Iowa State University)

In dual efforts to expand export opportunities and help local feed producers improve the quality of their products, the U.S. Grains Council (USGC) plans to utilize a grant provided by the U.S. State Department to create a Center for Feed Manufacturing in Tunisia.

“Centered in North Africa, U.S. suppliers face increasing competition in the Tunisian market from competitors in Europe, the Black Sea and South America,” said Ramy Hadj Taieb, USGC regional director for the Middle East and North Africa. “As a result, the Council’s work in Tunisia is becoming more strategic, focusing on how to utilize training programs to help develop both the Tunisian market and other markets in the region, while emphasizing the advantages of U.S. coarse grains and co-products.”

As part of establishing the Center, the Council, the Tunis National Institute for Agribusiness (INAT) and Iowa State University will train a core team of 10 industry professionals in feed manufacturing. The training program will target nutritionists, feed millers and poultry, dairy, beef and aquaculture producers in both intensive and extensive training programs as well as activities meant to foster development and professionalism within the industry. The core team of trainers will then return to the Center for Feed Manufacturing to subsequently train approximately 70 members of the next generation feed industry leaders in Tunisia.

The Council ultimately intends to expand the Tunisian center to be a regional training effort for the Middle East and Africa, as feed demand continues to increase considerably in these areas. Regional use of the center is expected to boost compound feed production, which will stimulate demand for U.S. corn, barley, sorghum and co-products.

U.S.D.A. Agricultural Research Service - Soft Wheat Quality Laboratory Annual Research Review

SOFT WHEAT QUALITY LABORATORY ANNUAL RESEARCH REVIEW

Wednesday-March 14, 2018

This Annual Research Review was held at The Ohio State University's Ohio Agricultural Research and Development Center in Wooster, Ohio.



WELCOME:

Dr. Alberto Pantoja, USDA-ARS-MWA Associate Director

Dr. David Benfield, Associate Vice President of Agricultural Administration and Director of the Wooster Campus, OSU

SWQL updates and research presentations

- Gluten strength, HMW-GS and rye translocation of eastern soft wheat
- Pre-harvest sprouting resistance of soft winter wheat and associated grain characteristics
- Protein composition and *in vitro* protein digestibility of modern and ancient wheat species

- The historic diversity soft wheat population has a wide range in pre-harvest sprouting resistance under natural or artificial conditions

Invited Speaker: Carl Griffey, Professor, Virginia Polytech

QTL Associated with Improved End-use Quality in Soft Red Winter Wheat Invited Speaker: Pierce Paul, Professor, The Ohio State University *Fusarium head blight mycotoxins and pre-harvest sprouting*

Invited Speaker: Andreia Bianchini, Associate Professor, University of Nebraska-Lincoln

From Field to Table: Improving the Safety of Wheat-based Products Invited Speaker: Kent Juliot, Vice President Research, Quality and Tech Services, Ardent Mills
Flour related food safety risks-An Industry Perspective

Forum – Wheat and Grain Safety, Moderated by Dale Nellor, NAMA Industry updates

Banquet Speaker: Eric Stockinger, Associate Professor Horticulture and Crop Science Dept.

AgriGold Conference Focus on New Technology for Grain Quality

(Sent on behalf of Chuck Hill, CCA, SSp, AgriGold Specialty Products Manager)

The annual AgriGold Specialty Products Conference was held on June 19th at the AgReliant Genetics Research Station near Champaign IL. There were three presentations that may be of interest to NC-213 members. The focus was on new technology that can be used for specialty corn programs.

The first presentation was on the FORCEFIELD Drying System developed by DryMAX Solutions of Dassel MN. This innovation is the introduction of using radio waves to dry grain, oilseeds, and other material. The radio waves push the water out of the kernel without using heat, which leaves the quality intact as compared to high heat drying. This is done with very little energy used. An additional benefit is insects and mold are killed. It is not known yet whether mycotoxins would be affected. They would welcome working with NC-213 members to explore this and other quality attributes. Test sites will be available this fall at select farms in the midwest comparing the FORCEFIELD dryer to the farmer's current dryer. The contact person there is Kevin Eichhorn (kevin@drymaxsolutions.com) Their website is www.drymaxsolutions.com.

Another presentation introduced us to the ExpresSeed Gene Detector. This product is not yet available. It measures biotech events as quickly as lateral flow strips with the accuracy of PCR. It detects DNA similar to PCR hence the accuracy. Further work is being done to offer multiple event testing similar to what is available from lateral flow strips used today. The contacts at ExpresSeed are Aaron Santos (aaron.santos@simpson.edu) and Derek Lyons (derek.lyons@simpson.edu). They also teach at Simpson College in Iowa. The website is www.expresseedgenetics.com.

The final presentation to bring to your attention is from SafeTraces. This company has developed a method of traceability for the food industry. It involves spraying a DNA code on the product. The code contains all the information about product. The spray used has been FDA approved and is safe to use. This would be of interest to those involved in FSMA applications. The contact person there is Ulrike Hodges (ulrike@safetraces.com) and the website is www.safetraces.com.

Feel free to contact any of these companies to get more information about their products. They all are interested in working with grain quality researchers. You can tell them you heard of their products from Chuck Hill at AgriGold.

International Calendar of Events

International Events Calendar:

JULY

July 15 – 18:

“Institute of Food Technologists Annual Meeting and Food Expo”.

McCormick Place. Chicago, IL, 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.

July 26 – 29:

“IAOM Central District Summer Meeting”.

Chateau on the Lake. Branson, MO, USA. Contact: 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: info@iaom.info, Web: www.iaom.info.

AUGUST

August 08 – 10:

“IAOM Flour City District Meeting”.

Maddens on Gull Lake. Brainerd, MN, USA. Contact: 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: info@iaom.info, Web: www.iaom.info.

August 28 – 30:

“2018 U.S. SOY Global Trade Exchange and Midwest Specialty Grains Conference and Trade Show”.

Kansas City, MO, USA. Contact: Midwest Shippers Association. 10800 Lyndale Ave So., Suite 159, Bloomington, MN 55420 USA. Tel: +1 (952)-253-6231, Fax: +1 (952)-253-6227, Email: staff@mnshippers.com, Web: www.grainconference.org.

SEPTEMBER

September 06 – 07:

“Tortilla Industry Association, T.I.A. 2018 Europe Technical Conference”.

Amsterdam, Holland. Contact: Tortilla Industry Association. 1400 North 14th Street, Arlington, VA 22209, USA. Tel: +1 (301) 301-367-8200, Fax: +1 (800) 944 6177, Email: info@Tortilla-Info.com, Web: www.tortilla-info.com.

September 07 – 16:

“Annual Kansas State Fair”.

Kansas State Fairgrounds. Hutchinson, KS, USA. Contact: Tel: +1 (620) 669 3600, Fax: +1 (620) 669 3640, Web: www.kansasstatefair.com.

September 11 – 13:

“68th Australasian Grain Science Conference, AGSA 2018: Grain Science Transforming our Future”.

Charles Sturt University. Wagga Wagga, NSW, Australia. Contact: Prof. Chris Blanchard, Charles Sturt University, Conference Chair. Email: conference@ausgrainscience.org.au, secretary@ausgrainscience.org.au, Web: www.ausgrainscience.org.au, <http://www.ausgrainscience.org.au/conference/2018-conference/>.

September 12 – 14:

“IAOM Western Canadian District Conference”.

Alberta, Calgary, Canada. Contact: 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: info@iaom.info, Web: www.iaom.info.

September 15 – 20:

“iba 2018 – The world’s leading trade fair for bakery, confectionery and snacks”.

Munich, Germany. Contact: Claudia Weidner, Project Director iba. German Bakers' Confederation. Neustädtische Kirchstr. 7a 10117 Berlin, Germany. Tel: +49 89 189 149 180, Fax: +49 89 189 149 189, Email: weidner@ghm.de, Web: www.iba.de, www.german-bakers.org.

September 19:

“IAOM Fall Joint Committee Meeting”.

Bavarian Inn Lodge. Frankenmuth, MI, USA. Contact: 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: info@iaom.info, Web: www.iaom.info.

September 19 – 21:

“IAOM Wolverine, Ohio Valley, Southeastern and Niagara Districts’ Joint Meeting”.

Bavarian Inn Lodge. Frankenmuth, MI, USA. Contact: 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: info@iaom.info, Web: www.iaom.info.

September 30 – October 2:

“IAOM, International Association of Operative Millers, Southeast Asia Region Conference & Expo”. Marriott. Manila, Philippines. Contact: 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: info@iaom.info, Web: www.iaom.info.

September 30 – October 3:

“12th Congress of the International Society of Nutrigenetics/Nutrigenomics, ISNN”.

Winnipeg, MB, Canada. Contact: International Society of Nutrigenetics/Nutrigenomics, ISNN. Web: www.nutritionandgenetics.org/Congresses. Sheraton Hotel (Richmond). Vancouver, Canada.

USDA ARS Stored Product Insect and Engineering Research Unit Update April 2018, updated July 2018

News

We are just emerging from a hiring freeze, so none of our vacancies have been filled. We have brought on a number of temporary undergraduate student workers to help out with research projects. Dr. Srinivas Lanka is post-doctoral researcher at Kansas State University on a grant-funded project on aerosol insecticides and is working with Frank Arthur, Dan Brabec, Mark Casada, and Jim Campbell.

Many scientists (Frank Arthur, Rob Morrison, Erin Scully, and Deanna Scheff), attended the Entomological Society of America Meeting North Central Branch Meeting in Madison WI. Jim Campbell traveled to Japan to give a series of presentations to the food industry on pheromones and mating disruption. Brenda Oppert attended the Advances in Genome Biology and Technology meeting in Orlando FL and gave an invited keynote presentation. Floyd Dowell went to Brazil to provide training on using NIR to evaluate mosquito traits. Rob Morrison was invited to give a departmental seminar at the University of Missouri, this was contributed travel.

Rob Morrison was selected to be a subject editor for the journal Environmental Entomology.

Frank Arthur, Jim Campbell, Rob Morrison, and Deanna Scheff were part of a team that also included researchers from Kansas State University and Oklahoma State University that submitted a grant proposal for the methyl bromide alternatives program targeting rice mill pest management.

Recently Submitted Research Publications

Stored Product Insect Integrated Pest Management

Susceptibility of different life stages of red flour beetle and sawtoothed grain beetle to cold temperatures.

Cold temperatures can be used to control stored product insects, but the lethal temperatures required for complete kill depend on the specific insect species and life stage, along with the time of exposure at specific temperatures. In addition, most studies are not conducted a low temperature ranges, which also affect susceptibility to cold. Exposing different life stages of the confused flour beetle and the sawtoothed grain beetle, two stored product insects that infest packaged and processed grain products, to low temperatures for different periods of time, we found that for confused flour beetle, larvae and pupae were more tolerant of cold temperatures than eggs or adults, and for sawtoothed grain beetle, eggs were the most cold tolerant than any of the other life stages. Overall, sawtoothed grain beetle was more

tolerant of cold temperatures than the confused flour beetle, however, exposures of at least 8 h to -5 F° killed all life stages of both species. Results of this study provide guidelines for using cold temperatures for controlling stored product insects, using exposure time-temperature combinations, and will be especially useful for organic storage industries.

This manuscript reports research conducted by two visiting scholars from Greece, Christos Athanassiou and Nickolas Kavallieratos, when they were working in Dr. Arthur's laboratory. For more information contact: Frank Arthur, 785-776-2783, frank.arthur@ars.usda.gov

Movement of adult red flour beetle and lesser grain borer after exposure to insecticide impregnated netting.

The key to stored product insect integrated pest management (IPM) programs for food facilities that handle grain and grain-based products is prevention because of the costs associated with treating insects once they enter a facility and the risks associated with infestation of the finished product. Given the mobility of the insects and limitations of currently available barriers, new methods to prevent infestation are needed. Long-lasting insecticide netting has been used to reduce the spread of malaria since the 1990s. More recently, it has been used to manage pests in pre-harvest agriculture in tree fruit and post-harvest agriculture with stored product pests. This netting could be used as barrier at food facilities to reduce insect movement into structures. Because stored product insects are too small for the netting to be an effective physical barrier, we assessed whether brief contact with the netting resulted in reductions in mobility and dispersal capacity of red flour beetle and lesser grain borer, two cosmopolitan and economically destructive stored product pests. Brief 1-min exposures resulted in the same 3-4-fold decrease in mobility as longer 10-min exposures to insecticide netting compared to controls without insecticide. Similarly, dispersal capacity of red flour beetle was reduced by 20-fold, while dispersal was completely absent in the lesser grain borer; controls in both cases dispersed without issues. Overall, our results show that short exposure to the netting, while not providing immediate mortality, did reduce the movement of the insects to the point where their ability to cause infestations was greatly reduced. These results contribute significantly to the prospect of diversifying integrated pest management programs for stored product insects.

This manuscript reports research conducted as part of a USDA NIFA Crop Protection and Pest Management funded project that involves multiple researchers from USDA ARS CGAHR, and Kansas State University. For more information contact: Rob Morrison, 785-776-2796, william.morrison@ars.usda.gov.

Evaluation of insect pest infestation and mycotoxin levels of maize in markets in the Northern Region of Ghana.

In developing countries around the world there is often limited reliable quantitative data on losses to stored grain after harvest and the factors that contribute to these losses, but this information is fundamental to developing and implementing improved grain storage programs. In Ghana corn (maize) is often stored and traded in markets, so the presence of insects and damaged kernels caused by insect feeding, and mycotoxin levels associated with fungal contamination were assessed over a storage season in multiple markets in the Northern Region of Ghana. Across all the markets and sampling periods grain temperature was greater than 30°C, which is favorable for stored-product insect development, although corn moisture tended to be low which should inhibit insect and mold growth. The primary stored product insects collected from the corn samples were red flour beetle, weevils, lesser grain borer, and rusty grain beetle. As the equilibrium moisture content increased the total number of insects recovered also tended to increase, but there was no relationship between corn temperature and the total number of insects. The average percentage of insect-damaged kernels (IDK) in the corn sampled across all the markets and sampling periods was approximately 3%, with a range between 0 and 21%. Using all the market and sampling month data, levels of insect damage tended to increase with corn moisture, but not with temperature, and levels of insect damaged corn also increased with number of stored product insects recovered. The action threshold for aflatoxin in maize in Ghana is 15 ppb, but overall mean aflatoxin level in the markets was approximately 20 ppb and aflatoxin levels ranged from 0.3 to 132 ppb, with 53% of the samples having levels above the threshold of 15 ppb. The mean fumonisin level was approximately 1 ppm, which is below the 4.0 ppm action threshold for Ghana. Our results show that aflatoxin levels were high in the market maize in Northern Region of Ghana and insects were prevalent, even though grain moisture tended to be relatively low, especially compared to the Middle Belt of Ghana where corn is also grown and stored.

This manuscript reports research conducted as part of a USAID Feed the Future Innovation project being conducted in Ghana Africa, with the research conducted by a graduate student in Ghana and supported by researchers at Kwame Nkrumah University of Science and Technology, Oklahoma State University, Fort Valley State University, University of Kentucky and USDA ARS CGAHR. For more information contact: Jim Campbell, 785-776-2717, james.campbell@ars.usda.gov.

Stored Product Insect Biology, Behavior and Ecology

Methodology for determining penetration of Indian meal moth larvae into multilayer polypropylene packages.

The Indian meal moth, is cosmopolitan stored product insect found throughout the world. The Indian meal moth larvae is capable of chewing through packaging materials and infesting the product inside, but limited information is available on penetration of multi-layer packaging and there is a lack of a standard methodology to test packaging integrity. We found that small, medium, and large larvae were all able to chew through the three different packaging materials tested and infest the product. However, the larger larvae were able to chew through more of the different types of packages tested and caused more damage to the product. The thickest package was most resilient to penetration by the Indian meal moth larvae. In conclusion, the methodology presented in this study provides a standard to use when testing future packaging products against the Indian meal moth and that given the variation in penetration of different packaging materials there is potential for improving packaging designs to increase protect of products.

This manuscript reports research conducted by a post-doctoral researcher Deanna Scheff, who is currently working with Frank Arthur and Jim Campbell, as part of her Ph.D. research project conducted under the direction of Subi. For more information contact: Deanna Scheff, 785-776-2783, Deanna.scheff@ars.usda.gov

Grain Quality Measurement

Impact of grain morphology and phenology on test weight of spring and winter wheat.

Wheat grades and grain prices are determined in part by test weight which is a basic physical measurement relating to the apparent density of the wheat. Flour millers value wheat that has healthy test weights, because it is typically associated with higher flour extraction rates and increased end-use quality. In this study the primary morphological grain traits that contribute to test weight in both hard winter and hard spring wheat classes were evaluated for 24 hard winter wheat and 32 hard spring wheat cultivars which were grown at different locations and during two seasons in South Dakota, and single grain density was shown to be the trait that accounted for most of the variation in the expression of test weight in both wheat classes. Although the test weight of wheat in both classes was also impacted by environmental factors such as growing location and season and other traits, the influence of single grain density on test weight was strong enough that it could be used by wheat breeders working to improve test weight. Test weight and expression of single grain density both were impacted by environment, single grain density is the trait that can most reliably be used to efficiently select indirectly for higher test weight because its measurement is amenable to high throughput methods. This method could be useful to breeders because little is known about the underlying genetic basis of grain density and test weight, which makes the use of molecular markers problematic.

This manuscript reports research conducted at South Dakota State University in which Dan Brabec, a current agricultural engineer, and Tom Pearson, a former agricultural engineer, with USDA ARS SPIERU have collaborated. For more information contact: Dan Brabec, 785-776-27313, daniel.brabec@ars.usda.gov.