

Grain Quality Newsletter

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

Volume 29:1

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

NC-213 Annual Meeting in Review

At this year's NC-213 Annual Meeting/Winter Technical Session, NC-213 members enjoyed sharing research that was presented during the technical sessions held February 18–20, 2009. Seventeen presentations, showcasing research from the three objectives, was presented. In addition, the industry panel discussion members facilitated informative conversation on the morning of February 19. In addition to NC-213 events, participants had the opportunity to interact with members of the Wheat Quality Council; both groups shared a banquet on Wednesday evening.

A highlight of the meeting is the Andersons Award of Excellence. This year's recipient is Dr. David S. Jackson, Professor, Associate Dean, Associate Director, University of Nebraska-Lincoln.

David's employment history includes the following: *University of Nebraska: Associate Dean* – Agricultural Research Division, **Associate**



David S. Jackson

Director – Nebraska Agricultural Experiment Station, **Professor**, Department of Food Science and Technology, **Interim Department Head**, Department of Food Science and Technology, (**Administrative Intern**, Agricultural Research Division (ESOP/ACOP Leadership Development Program), **Associate Professor (July 1994–June 2001)**). He received his Ph.D., December 1988, from Texas A&M University and other educational information: Department of Soil & Crop Sciences Major: Food Science & Technology (Starch Chemistry), (*Graduate Research & Teaching Assistant*, January 1987–December 1988), M.S., December 1986, Texas A&M University, Department of Soil & Crop Sciences, Major: Food Science & Technology (Alkaline Cooking/Corn Quality), (*Graduate Research & Teaching Assistant*, January 1985–December 1986), B.S., May 1984, Cornell University, Department of Food Science, Major: Food Science (Science Option). Other leadership accomplishments include: Professional Organization Service: NC-213 Multi-State Project: Chair (2005–2006), Vice-Chair (2004–2005), IFT: Carbohydrate Division Chair (1997–1998, and other offices), AACC: Carbohydrate Division Chair (2003–2004) & Symposium Organizer (2002–2003), AACC: Associate Editor, *Cereal Chemistry* (3 terms: 1995–2000, 2006–present).

News from USDA/ARS Grain Marketing and Production Research Center, Manhattan, KS

NC-213 Participants Share Their Research...



Improved characterization of sorghum tannins using size exclusion chromatography

Tannins are polymeric phenolic compounds that have antioxidant properties which are found in many types of plants. Some specific types of sorghum produce tannin in their grain at a level higher than that found in blueberries. The chemical composition of tannins may play a significant role on influencing their functionality. Several methods have been developed for characterization of tannins from different plants using a variety of techniques. Most of the methods are very time and resource consuming, however some provide a rapid separation of the tannin polymers using a relatively easy procedure. High performance size exclusion chromatography (HP-SEC) was used to characterize tannins from seven sorghum cultivars grown over two years to provide detail into the molecular size distribution of the tannin polymers. Area under all of the tannin peaks was highly correlated ($r = 0.95$) to the tannin content of the sorghum bran fractions in high and low tannin sorghum lines.

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Size distribution and rate of dust generated during grain elevator handling

Dust generated during grain handling can pose a safety and health hazard and is an air pollutant. Fifty percent of the 245 reported grain dust explosions in the United States from 1986 to 2005 were in grain elevators. Due to the high organic content and small size of the particles, high concentrations of grain dust pose an explosion hazard. The size of the particles affects the minimum explosive concentration and the force of the explosions. In addition, prolonged exposure to grain dust can harm grain-handling workers' health with smaller dust particles being carried deeper into the human respiratory system. To characterize the dust generated during handling of wheat and shelled corn dust samples were collected from the lower and upper ducts upstream of the cyclone dust collectors in the research elevator of the USDA Grain Marketing and Production Research Center. In the tests at an average grain flow rate of 54.4 t/h, the corn and wheat differed significantly in the dust size distribution and the rate of total dust generated. Shelled corn produced significantly smaller dust particles, and a greater proportion of small particles, than wheat. The corn produced more than twice as much total dust — 185 g/t of corn handled — than did wheat. These results improve our understanding of the health concerns of these grain dusts related to particle size and will be valuable for feed and grain handlers and grain elevator operators for evaluating and improving their handling and sanitation procedures to reduce their safety and health hazards and air pollution problems.

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Prediction of maize seed attributes using a rapid single kernel near infrared instrument

Non-destructive measurements of seed attributes would significantly enhance breeder selection of seeds with specific traits and potentially improve hybrid development. A single-kernel near infrared reflectance (NIR) instrument was tested for rapidly measuring maize seed attributes. At a throughput of five kernels/s, the instrument enables plant breeders to quickly select individual seeds that possess specific desired traits. Accuracy of the instrument was tested on 87 maize samples representing a wide variability in the essential amino acids, tryptophan and lysine, crude protein, oil and sugar content. Results showed crude protein and kernel mass were measured well. Tryptophan, lysine, and oil measurements were less accurate but have good potential for sorting individual seeds into high, medium, and low values. Sugar content was not measured accurately. The instrument has good potential to augment breeder development of nutritionally enhanced maize hybrids.

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Selecting and sorting waxy wheat kernels using near-infrared spectroscopy

Amylose-free, or waxy, wheat has functional endues advantages over amylose-bearing wheat, and these advantages can provide for additional marketing opportunities. For example, waxy wheat flour has a high water-binding capacity, products made from waxy flour can exhibit a longer shelf-life, products extruded from waxy flour can be enhanced, and ethanol conversion from waxy wheat is enhanced. However, when developing waxy wheat, as few as 1 in 64 kernels may express the waxy trait. Therefore, the ability to select waxy seed from early generation segregating populations would provide breeding materials enriched in the number of seeds with this trait. Also, if an advanced waxy breeding line requires purification for the waxy trait prior to release, there is presently no efficient or cost-effective way to accomplish this, especially since large seed samples are typically involved. We showed that an automated singlekernel near-infrared (SKNIR) sorting system could be used to select waxy kernels from segregating breeding lines or to purify advance breeding lines for the waxy trait. This rapid and non-destructive SKNIR technology offers significant benefits to breeding program and is much faster than utilizing molecular markers or staining techniques.

Contact Floyd Dowell, 785-776-2753, floyd.dowell@ars.usda.gov

Care to share your research with NC-213 readers? Send any research announcements to Bill Kosar, OARDC Director's Office kosar.3@osu.edu.

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Calendar items of interest ...

Upcoming deadlines and events

- Agricultural and Food Traceability Conference – Iowa Grain Quality Initiative. June 9 & 10, 2009. A Solutions-Based Conference Focused on Adding Value to Agricultural Commodity Products using Traceability. For more information, please contact igqi@iastate.edu.
- Anderson Research Grant Program – Regular Competition 2009: projected announcement date is June 2009 for a projected due date for proposals on September 1, 2009.
- Filing Deadlines: A reminder to our Executive Committee, the SAES 442 (Annual Report) is due 60 days after our Annual Meeting (due date: April 20, 2009) and the Minutes from the Annual Meeting are due 30 days (due date: March 20, 2009).

The Grain Quality Newsletter is published and distributed at no charge to NC-213 (formerly NC-151) participants and supporters of research on "Marketing and Delivery of Quality Grains and BioProcess Coproducts."

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Grain Science Post Doc Passes Away

On January 31, 2009, Dr. Dale Jude Pardo Moog passed away unexpectedly in Manhattan, Kansas. Dale was a post-doctoral research associate in the Department of Grain Science & Industry at Kansas State University. He joined the department in July 2008 after spending five and a half years at Purdue University, where he completed his Ph.D. in Agricultural and Biological Engineering in May 2006 and joined Dr. Maier's Purdue research group in June 2006.

Dale's expertise was post-harvest grain quality and stored product protection. His dissertation topic was "Measurement of Storability of Shelled Corn," which made him an expert in quantifying storage life of stored grains using CO₂ measurement and fungal plating and identification. At Purdue he was responsible for the management of the pilot bin facility of the Post-Harvest Education & Research Center including scheduling and overseeing all research trials and supervising undergraduate student employees. He also managed the Purdue Grain Quality Laboratory and the associated annual Indiana soybean and corn composition analysis service, which processed several thousand samples each harvest season submitted by farmers, county educators, researchers, grain buyers, and processors.

Dale was also responsible for several research projects for which he helped to obtain funding support via extramural grants. He most recently led an empty bin heat treatment project sponsored by TempAir (Burnsville, MN) and the Propane Education & Research Council; an early detection of grain spoilage project sponsored by BinTech (Boulder, CO) and USDA-SBIR; and a nitrogen modified atmosphere container disinfestation and shipment project sponsored by Holtec (St. Charles, MO) and the NC-213/The Andersons Research Grant Program.

Dale was a key contributor in successfully moving Dr. Maier's research group and projects from Purdue to K-State in the summer of 2008. He had looked forward to his move to K-State and was excited to join the Grain Science and Industry Department. In September and October of 2008, he accompanied Drs. Maier and Chayaprasert to China and Thailand, where he presented his research at the International Controlled Atmosphere and Fumigation Conference in Chengdu, China, and at Kasetsart University near Bangkok, Thailand. He also accompanied Dr. Maier on a visit to the Asian Institute of Technology near Bangkok, where they discussed current post-harvest and energy research projects. He subsequently went on to the Philippines to visit family and

friends and explore opportunities for collaboration with the University of the Philippines. He returned from that trip full of energy and with a number of new ideas that he was working on implementing until his untimely death cut him short from pursuing his goal of some day soon returning to the Philippines and putting his expertise to work on behalf of his beloved country.

Dale graduated from the Philippine High School for the Arts as Valedictorian in 1987. He completed his B.S. in Agricultural Engineering at the University of the Philippines, Los Baños in 1994. Dale received his M.S. in Agricultural Engineering from the University of the Philippines, Los Baños in 1999 and completed a minor in Marketing Management. In 2001 he participated in a special student program at the Asian Institute of Technology, Bangkok, Thailand, where he focused on the utilization of hybrid solar and biomass drying of tropical fruits. Between January 2000 and December 2002 he was a research associate at the University of the Philippines focusing on improving drying technologies for the preservation of grains, tropical fruits, flowers, herbs, and fish.

Dale passed the Professional Agricultural Engineering Licensure Exam in the Philippines in 1994. He was a member of the American Society of Agricultural and Biological Engineers, Philippine Society of Agricultural Engineers, University of the Philippines at Los Baños Alumni Association of America (lifetime member), and the League of Agricultural Engineering Students Alumni Association.

Dale was a people person who was liked by all. His warm smile and humble demeanor easily endeared him to others. He had a compassionate servant's heart always ready to help anyone who needed assistance. He loved cooking for others which frequently resulted in large gatherings of family and friends at his home for meals. Dale also loved entertaining people through his Karaoke singing—he had a wonderful voice! His personal qualities and professional expertise will be greatly missed by all of us!!!

Dr. Moog is survived by his wife Maribel and his two daughters Mika (7) and Dana (4), his parents, and two sisters.

Reprinted from Kansas State University's Department of Grain Science and Industry | 201 Shellenberger Hall | Manhattan | KS | 66506

Florence V. Dunkel, Associate Professor, University of Montana–Bozeman Awarded MSU President's Award for Excellence in Service Learning

This award, open to an MSU faculty member (tenured, tenure track, assistant, associate, or adjunct) and their community partner, recognizes the partnering pair who has together engaged students in quality service learning. Through service learning, students apply their academic skills and knowledge to address the genuine needs of a community organization. This provides students with a deeper understanding of their studies and fosters a stronger sense of civic responsibility. The award is in part a reflection of the quality of the partnership and how well the service learning course meets the best practices of service learning listed below:

- Identified learning objectives.
- Evaluation and/or assessment of student learning.
- Structured reflection activities.
- Addresses an actual community need.

Dr. Dunkel has been affiliated with NC-213 since 1978 and was contributed greatly to this program's success. She has served as Objective Co-Chair, Vice Chair, and Chair and was the recipient of the 2004 Andersons Cereals and Oilseeds Award of Excellence – In Recognition of Outstanding Research Accomplishments. Florence also hosted the 1994 and 2001 NC-213 Summer Workshops in Montana.



Florence V. Dunkel