

Grain Quality Newsletter

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

Volume 29:2

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

Calendar items of interest ...

Upcoming deadlines and events

- NC-213 Annual Meeting 2010: Our next Annual Meeting will take place in Kansas City, Missouri, at the Embassy Suites KCI. We will be meeting with the Wheat Quality Council. Details are being finalized. Tentative meeting dates: Wednesday, February 17 through Friday, February 19.
- Andersons Research Grant Program—Team Competition 2008: If your first year of research ends soon, don't forget to file an Annual Report with the Administrative Advisor's office to ensure that your second year funding will be released on time.
- Andersons Research Grant Program—Regular Competition 2009: The RFP was released with a due date for proposals of September 1, 2009.

International events

- August 3–5, 2009. "8th European Young Cereal Scientists and Technologists Workshop (8EYCSTW)." University of Tuscia, Viterbo, Italy. Contact: Cereals&Europe, Broekstraat 47, B-3001 Heverlee, Belgium. Tel: +32 (16) 204035, Fax: +32 (16) 202535, E-mail: info@cerealsandurope.net
- August 31–September 2, 2009. "5th International Technical Symposium on Food Processing, Monitoring Technology in Bioprocesses and Food Quality Management." Potsdam, Germany. Contact: Leibniz Institute for Agricultural Engineering, Potsdam-Bornim (ATB). Tel: +49-331-5699-613, Fax: +49-331-5699-849, E-mail: cig09@atb-potsdam.de, Web: www.atb-potsdam.de/CIGRPPostharvest2009
- September 9–11, 2009. "ISM Conference: Worldwide Mycotoxin Reduction in Food and Feed Chains." Tulln, Austria. Contact: E-mail: info@ism2009.at, Web: www.ism2009.at
- September 27–30, 2009. "World Congress on Oils and Fats and the 28th ISF Congress." Sidney, Australia. Contact: World Congress on Oils and Fats & 28th ISF Congress Secretariat, PO Box 601, Pyrmont NSW 2009 Australia. Tel: +61 2 9518 7722, Fax: +61 2 9518 7222, E-mail: info@isfsydney2009.com, Web: www.isfsydney2009.com
- September 27–30, 2009. "The 59th Australian Cereal Chemistry Conference." Wagga Wagga, NSW, Australia. Contact: Helen Taylor, Cereal Chemist, N.S.W. Department of Primary Industries Wagga Wagga Agriculture Institute PMB, Pine Gully Road Wagga Wagga, NSW 2650 Australia. Tel: +61+269381815, Fax: +61+269381809, E-mail: helen.taylor@dpi.nsw.gov.au
- October 14–27, 2009. "IV International Symposium on Sourdough: From arts to science." Freising, Germany. Contact: Web: www.sourdough.foodscience.ws
- October 21–23, 2009. "Flour—Bread '09—5th International/7th National Congress of Cereal Technologists." Opatija, Croatia. Contact: Web: www.ptfos.hr/brasno-kruh/

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."

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



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The NC-213 Objective 1 in our current workplan is described as, "To characterize quality attributes and develop systems to measure quality of cereals, oilseeds, and bioprocess coproducts." All NC-213 participants who are assigned to Objective 1, as indicated on the Appendix E, were encouraged to submit articles for this issue. Dr. Christian Nansen, Department of Entomology, Texas A&M University, AgriLife Research, provided an article on research as did Dr. Senay Simsek, North Dakota State University, Department of Plant Sciences. The balance of the articles in this issue relate to Objective 1.

At the February 2009 NC-213 Annual Meeting, members of NC-213 wanted to try something different with the Grain Quality Newsletter. We are going to assign each Objective (#1, #2, #3) to a newsletter (July, November, and February).

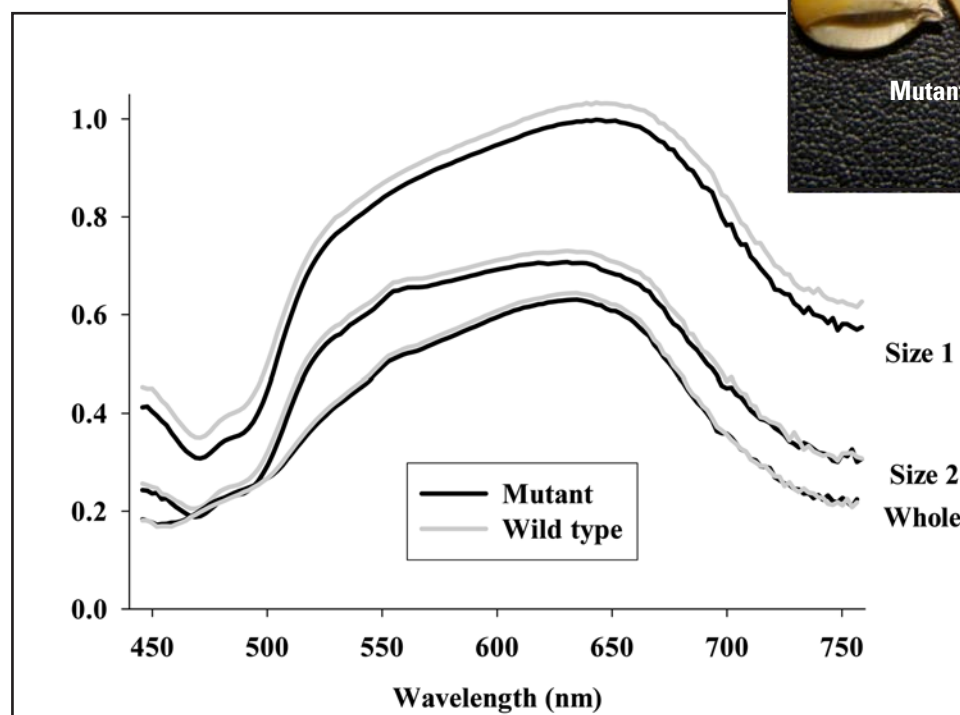
Considerations Regarding the Use of Hyperspectral Imaging Data in Classifications of Food Products, Exemplified by Analysis of Maize Kernels

Dr. Nansen is sharing research on the use of hyperspectral imaging data. Here is an excerpt from the paper, "Considerations Regarding the Use of Hyperspectral Imaging Data in Classifications of Food Products, Exemplified by Analysis of Maize Kernels," that appeared in the *Journal of Agricultural and Food Chemistry* 2008.

With growing interest in applications of ground based remote sensing in food technologies and agriculture, it is important to highlight both the limitations of spectral-based analyses and to develop robust analytical methodologies. There are several important challenges associated with spectral-based analyses of food/agricultural products. For instance, to what extent is it possible to reduce shape effects (variation in projection angle) when classifying reflectance profiles acquired from target objects, with distinct three-dimensional structures, such as, folded crop leaves or whole cereal grains, i.e. hard red wheat types, or when cereal grain breeders select seeds based on protein levels? In this study, we used near-isogenic inbred corn lines to address two basic questions: (1) to what extent is classification accuracy increased by grinding maize kernels? (2) Can the classification accuracy of two near-isogenic inbred lines be increased by using a spectral filter to only classify certain hyperspectral profiles from each image cube? We examined whole kernels and ground

kernels in two particle intervals: 0.250–0.354 mm (size) and 0.354–0.841 mm (size). We found that spectral profiles acquired from ground kernels had higher spectral repeatability than data collected from whole kernels. Independent validation confirmed that distinction between wild type and mutant inbred maize lines could be conducted with >80% accuracy after the proposed spectral filter had been applied to hyperspectral profiles of size 1 ground particles. The analytical approach, based on discriminant analysis, is relevant to most food quality control procedures based on spectral analysis, including analyses of fruits and vegetables and meat quality, in which dichotomous (i.e. reject vs. accept) classification is used.

For more information, or a copy of the entire article, please contact Dr. Christian Nansen (cnansen@ag.tamu.edu).



NC-213 Has Impact Low-Cost Sorting Device for Wheat

NC-213 scientists designed and built a low-cost sorting device for wheat using a standard personal computer and color camera. At a wheat throughput of 3.5 kg per hour, the sorter separates the wheat with an accuracy 15 to 20% higher than what can be achieved with traditional sorters. Four wheat breeders in the United States have already adopted this system as their tool of choice for separating red and white wheat.

Nitrogen Fertilizer Management Effects on Maize Grain Quality in the West African Moist Savanna

Dr. J. G. Kling, submitted the following research, which was published in *Crop Science* 38:1056–1061 (1998). S. O. Oikeh and A. E. Okoruwa were co-authors.

Until recently, breeding programs in Africa placed little emphasis on grain quality improvement. Consequently, some farmers have not adopted improved high yielding varieties because they lacked desired quality characteristics for processing and other end uses. We conducted this study to determine the effects of N application on some maize (*Zea mays* L.) grain quality parameters. In 1993 and 1994, five maize cultivars under four N levels (0, 30, 60, and 120 kg ha⁻¹) were evaluated at Zaria (11° 11' N), northern Nigeria, on a Plinthustalf (fine-loamy isohyperthermic). Increasing N levels increased grain yield, kernel weight, and grain protein quadratically for all the cultivars. The hybrid 8644-27 had the highest grain yield and kernel weight of 5.3 Mg ha⁻¹ and 26.62 mg kernel⁻¹, respectively. Average grain protein yield per unit area was not significantly different among cultivars in both years. At 30 to 60 kg N ha⁻¹, the cultivars 8644-27 and TZPB-SR had a greater percentage of floaters than the other cultivars in both years, reflecting a greater proportion of floury endosperm, indicating that they would be best for traditional dry milling, where the whole grain is ground to produce flour. Also, at 30 to 60 kg N ha⁻¹, SPL and TZB-SR had a relatively low percentage of floaters and high test weights of over 811 kg m⁻³ in 1993 and 778 kg m⁻³ in 1994, and should give high yields of grits when processed. Thus, both cultivars have high value for industrial dry milling. Results showed that the choice of cultivar and N level may affect grain quality and they should be considered in producing maize for dry milling purposes.

For more information, or a copy of the entire article, please contact the Administrative Advisor's Office.



NC-213 Researchers Share their Work Related to Objective 1

Production and processing factors that optimize carotenoid pigment content in semolina and pasta

Consumers prefer semolina and pasta with a rich yellow color. It has been observed that yellow pigment content is greater when durum wheat was grown in moderate- to low-moisture than in high-moisture environments. Seventeen durum wheat cultivars were grown at four locations in North Dakota. Research to date indicates that pigment content is greater with vitreous than nonvitreous kernels. Occurrence of vitreousness tends to be greater in moderate- to low-moisture than in high-moisture environments. The relationship between vitreousness and carotenoid pigment content might be coincidental. Durum cultivars ranged in carotenoid pigment content from 5.4 to 8.9% and pigment loss during pasta processing from 1 to 12%, when averaged over growing locations. Lowest pigment content and greatest pigment loss occurred with durum grown at Langdon, North Dakota, a high-moisture environment. This information will help producers select high quality durum wheat and aid processors in sourcing durum wheat or semolina from durum wheat grown in various regions of the Northern Great Plains.

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Structural Variation of Arabinoxylans in Hard Red Spring Wheat

Wheat flour, consisting mainly of the starchy endosperm of the kernel, contains starch (70–80%),

proteins (8–18%), lipids (1.5–2.5%) and non-starch polysaccharides (2–3%) all expressed as percentage of dry matter. The non-starch polysaccharides, originating from the cell wall of the aleurone and endosperm of the wheat kernel, are polysaccharides of pentose sugars and/or hexose sugars, of which arabinoxylan (AX) is the most important. Others include cellulose, β -glucan, arabinogalactan-peptide, and minor constituents like glucomannan and xyloglucan. AXs are divided into water extractable AX and water unextractable AX, which comprise 25% and 75% of the AXs present in wheat flour, respectively. AXs have significant role in the water holding capacity of flour, which is a very important characteristic in some end-product applications, such as refrigerated dough. Eight hard red spring wheat cultivars were grown at six locations in North Dakota. AX structure and endoxylanase activity was determined. Occurrence of low xylanase activity tends to be more common in moderate- to low-moisture than in high-moisture environments. Locations from the western part of the state (Dickinson, Hettinger, and Williston) showed relatively lower xylanase activity. Xylanase activity and AX chemistry varied significantly among varieties. Hard red spring wheat cultivars ranged in AX content from 4.8 to 13.4% and arabinose to xylose ratio varied between 0.68 and 0.98. Location, genetic and genetic location seems to be an important factor for AX chemistry. This information will help plant breeders and producers to select hard red spring wheat grown in various regions of the Northern Great Plains with desired end-product functionality.

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Larry Svajgr, Indiana Crop Improvement Association, presented "Quality Grain for Commodity Exports." Here we have an abstract.

A look at services available through the Association of Official Seed Certifying Agencies (AOSCA)

Presented by Larry Svajgr, Executive Director, Indiana Crop Improvement Association, September 17, 2007.

Topics in this presentation will include:

- The history of seed certification and services offered by AOSCA and seed certification agencies
- How seed certification skills are used to support production and marketing of quality grain
- AOSCA "Quality Assurance" and "Identity Preserved" programs
- A new approach developed by AOSCA, known as the "Quality Plus"

Management Standard and how it will add value to benefit producers: It is helpful to understand what services seed certification agencies provide to the agricultural industry. Seed certification began in the early 1900s as a way of assuring farmers that they were receiving varietal purity and quality in the seeds that they were purchasing. During that time, many new crop varieties were being developed and released to the public. However, due to a lack of standardized seed production and handling practices, the value of the new varieties was quickly lost soon after introduction, as they were intermingled and crossed with other varieties.

The principals of seed certification begin when new varieties are developed by plant breeders. Once new varieties are developed, they move into the certification system, in which a standardized and consistent set of principals is applied to the seed as it is increased in quantity for sale to growers. At each step of the seed certification process, agencies provide credible third-party inspections and audits which provide documented proof that seed producers are following seed certification standards. For generations, farmers have recognized the value of the familiar Certified "blue tag," which is attached to each container of certified seed. This provides a way of assuring that the seed in the container has met all of the requirements to earn the Certified seed tag.

For the complete presentation, contact Larry Svajgr
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