GMPRC
GRAIN MARKETING AND PRODUCTION RESEARCH CENTER

RESEARCH Kernels

www.gmprc.ksu.edu April 2005

Major Center Renovation Kick-Off Celebration Featured Senator Pat Roberts. On January 13, the Center hosted a Renovation Ceremony featuring Senator Pat Roberts as the keynote speaker. Other speakers included Mr. Riley Scott, Legislative Aide for Senator Sam Brownback; Dr. Rodney Brown, USDA Deputy Under Secretary for Research, Education, and Economics; Dr. Jon Wefald, President of Kansas State University; Dr. Will Blackburn, ARS Director of the Northern Plains Area; Mr. Adrian Polansky, Kansas Secretary of Agriculture; and Mr. Lyle Butler, President and CEO of the Manhattan Chamber of Commerce. Senator Roberts and his staff were instrumental in obtaining the $14.8 million needed for this renovation project. During the project, all heating, air conditioning, electrical, gas, air, and water services in the facility will be replaced and a new peaked roof will be added.

Senator Pat Roberts

In February 2005, all Center personnel with offices and laboratories located in the front two sections of the main facility were relocated to temporary quarters in the "Swing Space." A temporary new visitor's entrance to the Center has been established on the back (West) side of the building. The first renovation segment is expected to be completed in September with December 2006 as the target date for completion of the whole project.

Official Hand-Off of the Wind Erosion Prediction System (WEPS) 1.0 from ARS to NRCS. The latest and most cutting-edge model for forecasting wind erosion damage is a step closer to reaching growers and landowners in the wind-prone regions of the country. The system was developed and refined by scientists in the Center's Wind Erosion Research Unit. In a ceremony held in Manhattan, Kansas, on April 4, ARS officials transferred the erosion-predicting technology to the USDA's Natural Resources Conservation Service (NRCS), which will oversee its implementation across the United States. WEPS 1.0 can simulate weather, soil and crop conditions, and wind erosion on a daily basis. It can also project the emission of the tiny dust particles referred to as PM-10 that may pose risks to human health and the environment. Using WEPS 1.0, individual farmers will be able to formulate specific wind erosion control practices. The software can guide growers to the right approach—whether it's establishing a soil-stabilizing crop cover, setting up wind breaks and barriers or reducing soil's erodibility by giving it more texure. (Lawrence Hagen, telephone: 785-537-5545; email: lawrence.hagen@gmprc.ksu.edu)

Dr. Blackburn (ARS) hands WEPS to Dr. Clark (NRCS)

Study Shows Protein 3-D Structures Are Altered in Frozen Dough. The breadmaking quality of frozen dough is usually inferior to that of freshly mixed dough. We investigated the changes in the 3-D structure of wheat gluten protein due to freezing and thawing after dough had been frozen for varying periods of time. Results showed that the levels of beta-sheets and beta-turns decreased while the amounts of random coil and one type of alpha-helix increased the longer the dough was frozen. These changes in the 3-D protein structure are the opposite of the changes that occur during the

mixing of fresh dough. When fresh dough is formed during mixing, levels of the beta forms of the 3-D protein structures increase at the expense of the random coil and some of the alpha structures. (Okkyung Kim Chung, telephone: 785-776-2703; email: okkyung.chung@gmprc.ksu.edu)

How Big is That Loaf of Bread? One of the principal components of bread quality is loaf volume and rapeseed displacement has been the method of choice for measuring loaf volume for over 60 years. A new computer controlled laser system is now available. We compared the loaf volumes obtained with the two methods using 43 flour samples to make both PUP (100g flour) and pound-sponge-&-dough (300g flour) loaves of bread. Correlations between the two methods were very high (r^2->.99); however, volumes obtained with the rapeseed were higher (847 cc vs. 700 cc for PUP; 2256 cc vs. 2010 cc for Pound) than those obtained with the new laser method (Okkyung Kim Chung, telephone: 785-776-2703; email: okkyung.chung@gmprc.ksu.edu)

Control of Wheat Curl Mite. The wheat curl mite is known to be the carrier of wheat streak mosaic virus and often survives the summer on volunteer wheat. It can disperse from this "green bridge" in the fall to newly-planted winter wheat. Using greenhouse experiments, we measured wheat curl mite survival in response to treatment of volunteer wheat by glyphosate, paraquat, stem cutting, and withholding water. Mite populations on plants treated with paraquat or stem cutting decreased from the beginning of the sampling period. Mite populations on plants treated with glyphosate or which received no water continued to increase for three days after application and then began to decrease. Thus, if glyphosate is used to treat volunteer wheat, it should be applied well before wheat is planted in the fall in order to minimize the mite and wheat streak mosaic problems. We also found that the total green leaf area was a very good indicator of the level of mites in treated plants. (Robert Bowden, telephone: 785-532-2368; email: robert.bowden@gmprc.ksu.edu)

Will the Sound Wheat Kernels Please Ring Out! A system was built that dropped kernels onto a steel plate one at a time and then digitally analyzed the sound produced from the impact. Results showed that this system could distinguish between good sound kernels and those that were damaged by insects, hidden insect infestation, sprouting, and scab infections. Accuracy for detecting good kernels was 98%, insect damaged kernels with exit holes – 87%, scab damaged kernels – 70%, and hidden insect infestation – 45%. Speeds of approximately 70g per minute are possible with this non-destructive analytical technique. (Thomas Pearson, telephone: 785-776-2729; email: thomas.pearson@gmprc.ksu.edu)

We Can Predict That Noodle Color in 15 Seconds! Noodle color is an important quality trait for consumers and especially for wheat breeders. We investigated the potential of using NIR spectroscopy to predict noodle color and polyphenol oxidase (PPO) enzyme levels directly from whole grain, meal, and flour. Alkaline noodle dough was made from 585 hard winter wheat samples. Calibration models were developed for color indicators, L*, a*, and b*, and for PPO. The highest r^2 value (0.84) was obtained for L* and suggests that it may be possible to predict noodle color from whole grain materials using NIR. (Okkyung Kim Chung, telephone: 785-776-2703; email: okkyung.chung@gmprc.ksu.edu)

Nematodes May Protect Grain Bins from Attack. Nematodes are the most numerous multi-celled animals on earth. Many of these microscopic creatures are parasites of insects and have potential as possible insect control tools. Results from experiments with a specific nematode, *Steinernema riobrave*, in empty grain bins show that it is effective at suppressing populations of both the red flour beetle and the Indianmeal moth. However, other experiments against different insect pests showed that this nematode seems to prefer to infect host species that are already infected with nematodes if given a choice. This could limit its usefulness as a control agent. (James Campbell, telephone: 785-776-2717; email: james.campbell@gmprc.ksu.edu)

U.S. Department of Agriculture, Agricultural Research Service, Grain Marketing and Production Research Center, 1515 College Avenue, Manhattan, KS 66502. Phone: 800-627-0388.