GMPRC
GRAIN MARKETING AND PRODUCTION RESEARCH CENTER

RESEARCH Kernels

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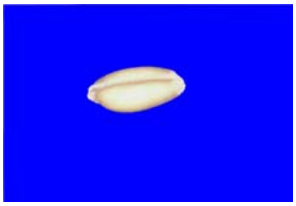
Addition of Camera to SKCS Provides Accurate Kernel Size Information. Wheat kernel size and shape are important quality factors. Knowing kernel sizes and shapes can provide valuable information for adjusting mills to obtain the maximum flour yields. Wheat shipments having kernels of uniform size are preferred over shipments that have a wide variation in kernel sizes due to the higher potential flour extractions that are possible from kernels of more uniform size. Measuring kernel size is tedious and time consuming. As a result, variability in wheat kernel size is not available for most shipments. The Perten Single Kernel Characterization System (SKCS 4100) is an automated instrument which measures several single kernel parameters including weight, moisture content, hardness, and diameter. Of all of these measurements, kernel diameter is the least accurate. A low-cost color camera was attached to a SKCS 4100 and, using image data combined with other SKCS data, errors in estimating kernel length and diameter were reduced by 56% and 66% respectively. Analytical speed of the current system is 2 kernels per second, making it possible to obtain accurate size information on a representative 300-kernel sample from any wheat shipment in 2.5 minutes. (Thomas Pearson, telephone: 785-776-2729; email: thomas.pearson@gmprc.ksu.edu)



Picture of wheat kernel

Protein Quality in Bread Dough Can Be Accurately Predicted Using NIR. Protein quality is a major factor determining the type of products that can be made from wheat flour. Proper dough formation is generally attributed to the quantity and quality of the gluten protein present and it is the component that is most directly related to the breadmaking properties of wheat. Recent gluten research has focused on the significance of long-chain protein structures called "polymeric proteins." Two types – those that are soluble in water and those that are not – exist in wheat flour and a number of studies have confirmed that the insoluble polymeric proteins are directly related to dough strength. One hundred hard winter wheat flours from wheat harvested at two federal regional performance nurseries were analyzed for quality using standard baking and milling tests. Selected flours were also analyzed for the soluble and insoluble polymeric protein content. Using near-infrared reflectance spectral data, the levels of insoluble polymeric proteins could be predicted with an accuracy sufficiently high (r^2 = 0.83) that the NIR can now be used as an alternative tool for providing rapid protein quality measurements on wheat flour. Results may be especially beneficial to wheat breeders in the development of new varieties. (Bradford Seabourn, telephone: 785-776-2751; email: bradford.seabourn@gmprc.ksu.edu)

Myosin ELISA Test May Underestimate Levels of Insect Infestation in Grain. The insect fragment count has been used as the standard procedure for food analysis for many years; however, it requires technical training and is time consuming and relatively expensive. An alternative to the insect fragment count is a commercial immunoassay (ELISA) method that detects the insect muscle protein, myosin; however, there are concerns that myosin may break down over time. To test this, Hard Red Winter wheat was infested with larvae of the lesser grain borer and then fumigated to kill the larvae inside the kernels. Infected kernels were then "aged" at 90°F for either 0, 14, 28, or 56 days after fumigation. Myosin degradation was most rapid in the first two weeks after the larvae were killed, decreasing 58.4%. There were no significant differences in myosin degradation between samples that were 14, 28, and 56 days old. These results indicate that the myosin

ELISA test may underestimate the amount of insect contamination in grain that has been previously fumigated. Based on our results, an estimate of insect density for previously fumigated grain could be obtained by multiplying the ELISA value by 2.5. (Paul Flinn, telephone: 785-776-2707; email: paul.flinn@gmprc.ksu.edu)

How Far Does Dust Travel During a Wind Erosion Event? Dust that becomes suspended as wind erodes a field can become deposited on nearby vegetation and have detrimental effects on plants and soil and water quality in the area. This study was designed to determine how dust is deposited in regions that are from 0 to approximately 600 feet from an eroding field once a wind erosion event occurs. We measured the levels of dust in suspension from a small field containing sandy loam soil after 8 separate dust storm events. An average of 34% of the total dust that was suspended in the air from this field was deposited on plants within 600 feet of the eroding field. Actual amounts of deposited dust ranged from 18.0 to 147.4 kg per square meter. Approximately 30% of the suspended dust was deposited on vegetation within approximately 150 feet from the eroding field but only 12 to 15% was deposited within the initial 30 feet. These results suggest that the typical 30 ft-wide buffer strips of vegetation that are currently being used to try to trap the suspended dust leaving a field will not capture much of this dust. (Lawrence Hagen, telephone: 785-537-5545; email: lawrence.hagen@gmprc.ksu.edu)

Dust Collection Apparatus

Center Renovation Is On Schedule. Visitors to the Center will notice definite progress in the renovation of this facility. As shown in the picture, two new mechanical rooms have been framed on the roof and one of these is nearing completion. In addition, portions of the new roof that will be placed over the entire facility are beginning to emerge. With the cooperation of scientists at Kansas State University, we have been able to continue 100% of our research programs during this renovation process.

Two new mechanical rooms and rafters for new roof

GMPRC Is Seeking Research Leader for the Grain Quality and Structure Research Unit (GQSRU). After over 31 years of faithful service, Dr. Okkyung Kim Chung (Okky) has decided to retire and spend more time spoiling her grandchildren. As a result, we are seeking a Supervisory Research Chemist, Food Technologist, or Biologist with leadership skills and extensive research experience in cereal chemistry to assume the duties of Research Leader of the GQSRU. The announcement number is ARS-X5W-0408 and applications must be postmarked, e-mailed, or faxed by December 19, 2005. Applicants must be U.S. citizens. For copies of vacancy announcements and/or application materials, please call (310) 504-1482. For additional information regarding employment opportunities, please visit http://www.afm.ars.usda.gov/hrd/jobs/apply.htm.

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