



# RESEARCH Kernels

[www.gmprc.ksu.edu](http://www.gmprc.ksu.edu)

July 2002

- **Infrared Spectroscopy of Doughs Yields Important Chemical Information.** Scientists have known for many years that specific types of proteins were needed in wheat flour in order to bake good products such as breads, cookies, etc. GMPRC scientists have used a new type of infrared instrument to monitor changes in the structures of proteins in Hard Winter wheat flour during dough formation. Results indicate that, as the dough forms during mixing, protein structure becomes more organized in very specific ways. Monitoring these changes in structure with time provides a tool for very accurate assessment of important properties such as the mix time - that point when the dough is ready to be processed.  
(Brad Seabourn, telephone: 785-776-2751, email: [brad@gmprc.ksu.edu](mailto:brad@gmprc.ksu.edu))
- **Male and Female Red Flour Beetles Respond Differently to Pheromone Traps.** The red flour beetle is a major pest of food processing facilities and warehouses, but the pheromone lure used for the monitoring of this insect is widely perceived as not very effective. A study has been undertaken to determine how red flour beetle adults behave around pheromone traps. The following questions are being addressed: over what range are insects attracted, what is the probability of capture, and how is insect response to traps influenced by the use of different combinations of attractant (pheromone, food oil, or pheromone + food oil combinations)? Experiments performed to date indicate that females are more likely to be captured in traps with the pheromone and food oil combination, but males are more likely to be captured in traps with pheromone alone. However, even when looking at only the best attractant for a given sex, only 25% of individuals released 25 cm from the trap were captured. Further experiments will be performed to determine how mating status, starvation level, and air movement influence responsiveness to the traps. With this information we will be better able to implement and interpret monitoring programs.  
(Jim Campbell, telephone: 785-776-2717, email: [campbell@gmprc.ksu.edu](mailto:campbell@gmprc.ksu.edu))
- **NIR Can Detect Both Dead and Live Insects Inside Wheat Kernels.** A commercially available NIR system was used over a two-month period to scan single wheat kernels that contained live or dead internal rice weevils at various stages of growth. Correct classification of sound kernels and kernels containing live insects at pupal, large, medium-sized, and small larval stages averaged

94%, 92%, 84%, and 62% respectively. Calibrations developed using live insects detected dead internal insects with accuracies ranging from 86% to 96%. Calibrations that were developed with dead insects (up to 56 days after death) correctly detected the presence of live internal insects with accuracies ranging from 92% to 93%. These results show that calibrations can be developed using infested samples containing either live or dead insects.

(Floyd Dowell, telephone: 785-776-2753, email: [fdowell@gmprc.ksu.edu](mailto:fdowell@gmprc.ksu.edu))

- **New Resistance Gene to Leaf Rust Discovered.** Leaf rust is a serious disease in wheat that can occur in all regions where wheat is grown. New genes for resistance to this disease are constantly needed in order to combat the new races of fungi that are evolving. In this study, we transferred a leaf rust resistance gene from the wild species *Ae. tauschii* into cultivated wheat. Genetic analysis revealed that this resistance gene (designated Lr39) is different from the resistance genes that had been previously isolated from this wild species.

(Gina Brown-Guedira, telephone: 785-532-7260, email: [gbg@ksu.edu](mailto:gbg@ksu.edu))

- **Computer Model Altered to Simulate Soil Conditions in the Presence of Mulch.** The ENergy and WATer BALance (ENWATBAL) computer model simulates soil water content and temperature, loss of soil moisture through evaporation, and the rate of moisture transpiration from crops. It has been used to evaluate the effects of different management practices to conserve water, which is especially important in dry climates. ENWATBAL can also be used to assess the effects of management on soil temperature which is important for such things as nutrient availability, disease development, and crop growth. However, this model does not simulate the effects of vegetative mulches which are becoming more common, especially in reduced-tillage farming systems. We modified this model so that it accurately simulates soil conditions in the presence of mulch and we also adjusted some of the mathematical equations in the model so that the enhanced version runs approximately 50 times faster.

(Simon Van Donk, telephone: 785-537-5538, email: [sdonk@weru.ksu.edu](mailto:sdonk@weru.ksu.edu))

- **Wind Erosion Research Unit Moves to Main Facility.** This past week, members of the Wind Erosion Research Unit have moved their offices to the main research facilities of GMPRC. Their new address is:

USDA-ARS-GMPRC Wind Erosion Research Unit  
1515 College Avenue  
Manhattan, KS 66502

Their new telephone number is: 785-537-5559; FAX 785-537-5507

(Ed Skidmore, telephone: 785-537-5530, email: [skidmore@weru.ksu.edu](mailto:skidmore@weru.ksu.edu))