



RESEARCH Kernels

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- Wind Erosion Research Scientists Develop Soil Roughness Determination Method.** Knowledge of the land surface roughness is important information needed in order to predict the levels of damage expected due to wind or water erosion. Elaborate pin meters, lasers, photographs, and various other techniques have been used to measure or estimate the random roughness in the field. Often these elaborate or high-tech devices are not available when and where producers need an estimate of the expected amount of soil erosion. Therefore, we have developed a simple procedure involving tossing a one-meter straight edge randomly into the field and then measuring the distance between the points where soil contacts the straight edge and the maximum depth of the depression in between these two points. This technique would greatly reduce the time and cost of estimating field surface roughness. (Ed Skidmore, telephone: 785-532-6726, email: skidmore@weru.ksu.edu)
- High Temperatures Decrease the Effectiveness of Cyfluthrin WP.** Red flour beetles were exposed at different time intervals on concrete treated with cyfluthrin (Tempo WP) and held at different temperatures. Bioassays were conducted at 2-week intervals for 8 weeks. After 2 weeks, beetles exposed at temperatures of 25°C (77°F) began to survive and by 8 weeks, survival at this temperature was at least 90%. In contrast, survival of beetles exposed at 20°C (68°F) remained below 5% for the entire 8 weeks. These results indicate that cyfluthrin may have to be applied more frequently to control red flour beetles during the warmer months of the year or in warmer climates. (Frank Arthur, telephone: 785-776-2783, email: arthur@usgmrl.ksu.edu)
- Tripsacorn is Immune to Maize Weevils.** The maize weevil is one of the most serious insect pests of corn during storage. In collaborative studies with Dr. Mary Eubanks of Sun Dance Genetics, whole kernels of Tripsacorn, a hybrid of two possible ancestors of modern corn, was shown to be immune to attack by the maize weevil. Female maize weevils were unable to lay eggs in the Tripsacorn kernels. This may be due to the hard shell-like fruitcase that covers these kernels. Tripsacorn also is heat and drought tolerant, cold tolerant, has hybrid vigor, and is resistant to corn root worms and corn leaf aphids. Further breeding is being conducted at Sun Dance Genetics to incorporate genes responsible for these desirable traits into modern corn varieties using conventional breeding techniques. We are currently testing some of these new

hybrids for resistance to maize weevils and other storage insect pests in order to identify the genes responsible for these quality traits. (Jim Throne, telephone: 785-776-2796, email:

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- **Evaluation of Particle Films for Controlling Stored-Product Insect Pests.** Experimental particle films have been developed to repel or control insect pests in fruit orchards. These materials are similar to inert dusts like diatomaceous earth, and they were evaluated as a surface treatment to control red flour beetles and confused flour beetles. Confused flour beetles were less susceptible than red flour beetles and the mortality of both species decreased as the relative humidity increased. However, when given food after exposure, the survival of these beetles was virtually 100% regardless of how long they were exposed to the particle film. Results were comparable to those obtained with a commercial formulation of diatomaceous earth. (Frank Arthur, telephone 785-776-2783, email:arthur@usgmrl.ksu.edu)
- **Development of Area-Wide Integrated Pest Management (IPM) Programs for Grain Elevators.** Current insect pest management practices and insect infestation levels in wheat have been monitored for two years at 13 grain elevators in Kansas in collaboration with Kansas State University and at 15 elevators in Oklahoma in collaboration with Oklahoma State University. This study has shown that sampling stored grain for insects can improve pest management. Results also indicated that cooling wheat soon after it is placed into storage in late June or early July using automated fans that are turned on when outside air temperatures drop sufficiently is a cost-effective alternative to fumigation. Improvements in insect pest management at grain elevators will help maintain the quality of the U.S. food supply and our competitiveness in global markets. (David Hagstrum, telephone: 785-776-2718, email:hagstrum@usgmrl.ksu.edu)
- **Targeting the Insect Digestive System Identifies New Biopesticides.** Digestive proteinases are special enzymes present in living organisms that help them digest the proteins in their food. Proteinase inhibitors are compounds that prevent the activity of these vital enzymes. The red flour beetle was effectively controlled with the use of several proteinase inhibitors. We have determined that a specific serine protease is critical to the survival of the Indianmeal moth and we will be identifying inhibitors that stop this enzyme. (Brenda Oppert, telephone:785-776-2780, email:bsu@ksu.edu)
- **GMPRC Scientist Receives Research Grant and Post Doctorate Funding.** Dr. Karl Kramer will be the co-principal investigator with scientists from Kansas State University on a \$73,700 research grant from the Kansas Corn Commission. The goal of this project will be to produce genetically engineered corn plants that are resistant to corn rootworms by inserting a gene from insects that produces chitinase. Chitinase is an enzyme that dissolves certain structural components in insects that are made of the material called "chitin." Plants will be designed so that

they express high concentrations of chitinase in the roots with little or none in the grain, leaves, or stems.

- The Agricultural Research Service (ARS) has also awarded Dr. Kramer funding for a post doctorate research position for the next two years. The goal of this project is to determine how insects protect themselves from bacterial infections. Such information may lead to new ways of controlling insect pests. This award was one of only five that were received by ARS scientists located in the states of Montana, North Dakota, South Dakota, Wyoming, Nebraska, Colorado, Utah, and Kansas. (Karl Kramer, telephone 785-776-2711, email:kramer@usgmrl.ksu.edu)
- **GMPRC Will Co-Host Another International Wheat Quality Conference.** GMPRC is working with its other partners in the Grain Industry Alliance including Kansas State University, the American Institute of Baking, and DPRA, a consulting firm, to plan a second International Wheat Quality Conference (IWQCII) to be held in Manhattan. The first conference was held in May 1997 and was attended by over 300 participants from all segments of the wheat industry representing 30 different countries. Dates for IWQCII are May 20 - 24, 2001, and information can be obtained on the Internet at:<http://www.gmprc.ksu.edu/iwqc-ii>.

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