GMPRC
GRAIN MARKETING AND PRODUCTION RESEARCH CENTER

RESEARCH Kernels

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- **Biological Control Prevents High Insect Fragment Counts in Flour.** Biological control is an important component of integrated pest management of stored grain. There are several species of parasitic wasps that attack most of the insect pests of stored grain. These harmless wasps are very small (a small fraction of an inch in length) and do not feed on the grain. Because the adult wasps are external to the grain kernels, they can easily be removed using normal cleaning processes. In this study, we wanted to find out if using these wasps to control insect infestation levels in grain would increase or decrease the level of insect fragments found in flour milled from this grain. Six 1000- bushel bins filled with wheat were used for the study. Lesser grain borer adults were released into all six bins and wasps were released into three of the bins. After 131 days of storage, lesser grain borer beetles were reduced by 91% in the bins treated with the wasps compared to the control bins and the level of insect damaged kernels was also reduced by 92% in the bins treated with wasps. Analysis of the flour milled from the grain in each of the bins showed that the insect fragment counts from the bins containing the wasps were 89% lower than values from flour in the control bins. These results indicated that the release of parasitoid wasps into grain bins as a means of controlling insect infestation will not increase the insect fragment count found in the flour, but will greatly decrease it when compared with control bins. (Paul Flinn, phone: 785-776-2707, email: flinn@usgmrl.ksu.edu)

- **Continued Studies of the Effectiveness of Biopesticides to Protect Plants from Insect Pests.** Agricultural crops worldwide suffer from a vast array of insect pests which cause severe damage and loss. One of the strategies to combat this loss is to incorporate new genes into the plant that produce protective chemicals termed biopesticides. In previous work, we have shown that when the gene that codes for an enzyme called chitinase was incorporated into plants, these plants were much less susceptible to insect pest attack. This enzyme destroys an important structural component within the insects and when they eat the plants having this gene, the chitinase acts to destroy them. Current studies are centered on determining the specific relationships between the structure of this enzyme and its functions. When a specific tryptophan amino acid residue in this enzyme was converted to a phenylalanine or a glycine residue, the enzyme was less effective at destroying insects. Such results provide important information about the structure that is needed for optimum activity and may eventually lead to the development of a more effective plant

protection system. (Karl Kramer, phone: 785-776-2711, email: kramer@usgmrl.ksu.edu)

- **Waxy Wheat Detection Using NIR.** Wheat has three waxy proteins that affect the amount of amylose present in the starch. True waxy wheats lack all three waxy proteins and have very little amylose. Partially waxy wheats contain only one or two of the waxy proteins and from 1% to 20% of the starch may consist of amylose. Normal varieties containing all three waxy proteins contain from 25% to 30% amylose in their starch. Amylose content affects noodle quality, shelf-life, and the pulp quality of paper. This study was designed to determine if the number of waxy proteins present could be detected using NIR spectroscopy of starch from several ground kernels. Results showed differences in absorption characteristics between all sample groups. True waxy wheats were easily differentiated from partially waxy and normal wheats. However, it was difficult to distinguish samples containing only one waxy protein from those containing two waxy proteins. (Floyd Dowell, phone: 785-776-2753, email: fdowell@usgmrl.ksu.edu)

- **Wind Erosion Prediction System is Released for Testing.** The Wind Erosion Prediction System (WEPS) is a computer modeling system designed to assist producers and planners with evaluating various wind erosion control methods and developing conservation plans. It was developed in response to customer requests. Users supply information on field size, shape, and location along with proposed erosion management practices. The program uses climate, crop, and soil databases to predict the total soil loss, amount of soil going into suspension and other off-site effects of this loss. The WEPS model also simulates plant growth and residue decomposition. WEPS 1.0 is now being tested by the Natural Resources Conservation Service. (Ed Skidmore, phone: 785-532-6726, email: skidmore@weru.ksu.edu)

- **GMPRC Will Cosponsor the Annual Technology Preview of the Grain Industry Alliance.** The Grain Industry Alliance (GIA) is composed of the American Institute of Baking; DPRA, Incorporated (a private for profit consulting firm); Kansas State University; and GMPRC. The GIA will hold its first Technology Review program on September 16-18, 1999, in Manhattan, KS. The purpose of this Preview is to better inform the members of the grain industry of the research programs and capabilities of GIA and to engage in a dialogue to direct future research into areas of relevance for industry members. Anyone involved in the grain industry from producers to manufacturers is invited to attend. Agenda and registration information is available on the Internet at http://ww.aibonline.org/gia or contact Dr. Ron Madl at 785-532-7035.