

Our Latest Research Results - March 2012

Behavior of Larval *Culicoides Sonorensis* (Diptera: Ceratopogonidae) in Response to an Invertebrate Predator, *Hydra littoralis* (Anthomedusae: Hydridae)

Author: W.K. Reeves

Submitted to: Entomological News

Larvae of biting midges live in the water. In their natural habitat they are exposed to numerous predators. Predator avoidance behavior has not been studied in most biting midges. Based on laboratory data the larvae of some biting midges behave differently when jellyfish like predators are present in the environment.

Contact Lee Cohnstaedt, telephone 785-537-5592, email Lee.Cohnstaedt@ars.usda.gov

An Efficacious Single-Dose Vaccine Candidate against Rift Valley Fever Virus

Authors: R. Koukuntla, R.B. Mandell, S. Kisselev, L.J.K. Mogler, J.T. Lizer, J.A. Griffel, E.J. Dasen, A. Freiberg, T. Juelich, L. Zhang, B.K. Martin, B.S. Drolet, N. Vahanian, C.J. Link, R. Flick

Submitted to: Vaccine

Rift Valley fever virus (RVFV) continues to cause a deadly disease in both humans and livestock. No FDA- or USDA-approved vaccine is currently available. There is clearly a need for a safe and efficacious vaccine against this fast spreading, emerging and re-emerging pathogen. We developed and evaluated an RVFV vaccine using a few select proteins of the virus. A single vaccination was highly protective in a mouse model. The vaccination prevented virus infection and no damage to organs was observed.

Contact Barbara Drolet, telephone 785-537-5569, email Barbara.Drolet@ars.usda.gov

Susceptibility of Stored-Product Psocids to Aerosol Insecticides

Authors: G.P. Opit, F.H. Arthur, J.E. Throne, M.E. Payton

Submitted to: Journal of Insect Science

Psocids (insects which are also called booklice) are pests of stored grains and grain products in most of the world, and they have natural tolerance to some of the insecticides used for control of other stored-product insect pests, such as beetles and moths. Aerosol insecticides are used in flour mills and warehouses to control beetle and moth pests, but their effect on psocid pests needs to be determined. We evaluated two commonly used aerosol insecticides, methoprene and esfenvalerate, applied alone and in combination for

control of four species of stored-product psocid pests. The greatest mortality of psocids attained was 76% for immature psocids and 62% for adult psocids, indicating that the aerosols did not provide effective control of the tested psocid species. This study shows that psocids may be tolerant to these aerosol insecticides when applied at rates that are normally effective for control of other stored-product insect pests. This information will help pest managers choose appropriate control strategies for psocid pests.

Contact James Throne, telephone 785-776-2796, email James.Throne@ars.usda.gov

A Comparison of Auction and Choice Experiment: An Application to Consumer Willingness to Pay for Rice with Improved Storage Management

Authors: L. Su, B. Adam, J. Lusk, F.H. Arthur

Submitted to: Journal of Agricultural and Resource Economics

Stored-product insects such as the lesser grain borer are generally removed from rough rice during the milling process, so that there should be little effect of that infestation on taste and quality of the milled rice. We conducted actual taste test studies with a consumer panel to see if this was true. We then developed a test to determine if our panelists would pay more for rice if they knew it was being specifically managed to reduce insect infestations. We used two methods for the test, an "auction" where consumers could bid specific prices and choice of two different prices, the higher one reflecting improved management. Results showed consumers may pay a higher price for perceived improvements in rice quality, especially when given specific information as to how the rice was managed to limit insect infestation.

Results will benefit those responsible for developing insect management programs for stored bulk rice, which in turn will benefit consumers by providing them with higher product quality.

Contact Frank Arthur, telephone 785-776-2783, email Frank.Arthur@ars.usda.gov

***Bacillus thuringiensis* Cry3Aa Toxin Increases the Susceptibility of *Crioceris quatuordecimpunctata* to *Beauveria bassiana* Infection**

Authors: Y. Gao, B.S. Oppert, J.C. Lord, C. Liu, Z. Lei

Submitted to: Journal of Invertebrate Pathology

The spotted asparagus beetle is a major pest of asparagus world-wide. There is a need for viable

alternatives to chemical insecticides for their control that are compatible with integrated pest management. The most apparent candidate for such an alternative is a commonly used bacterial insecticide, but it is not effective for this beetle. We demonstrated that non-lethal exposure of the beetle to the bacterial insecticide made it more susceptible to a commercial insecticidal fungus. This research will help to provide growers with safe, environmentally friendly alternatives to chemical insecticides.

Contact Jeff Lord, telephone 785-776-2705, email Jeff.Lord@ars.usda.gov

Development of High-Density Genetic Maps for Barley and Wheat Using Genotyping-By-Sequencing

Authors: J.A. Poland, P.J. Brown, M.E. Sorrells, J.L. Jannink

Submitted to: PLoS One

The barley and wheat genomes are large and complex, a feature that has greatly hindered the development of molecular markers useful for marker-assisted selection in plant breeding programs. Further, new statistical approaches such as genomic selection can make predictions of expected performance for yield and other complex traits by using information from dense genome-wide molecular markers. In this study we have utilized next-generation sequencing capacity to generate tens of thousands of molecular markers in barley and wheat in an approach termed "Genotyping-by-sequencing". These markers were developed at a relatively low per sample cost and represent a considerable advance in the tools available for wheat and barley breeding and genetics. Advancements in sequencing technology will continue to decrease the per sample costs for this approach while providing more and more marker data points, making the genotyping-by-sequencing method the molecular marker platform of choice in the future.

Contact Jesse Poland, telephone 785-532-2709, email Jesse.Poland@ars.usda.gov

Effect of High Molecular Weight Glutenin Subunit Allelic Composition on Wheat Flour Tortilla Quality

Authors: T.O. Jondiko, N.J. Alviola, D.B. Hays, A.M. Ibrahim, M. Tilley, J.M. Awika

Submitted to: Journal of Cereal Science

The tortilla industry is one of the fastest growing segments of the U.S. baking industry with annual sales surpassing \$6 billion. The growing popularity of tortillas is attributed to their convenience as wraps that suit on-the-go lifestyle. In the US, consumers prefer refined wheat flour tortillas that are flexible, opaque, large in diameter that have a long shelf life. Currently, the tortilla industry uses bread wheat flour and chemical ingredients, e.g., reducing agents, to achieve the required functionality for tortilla production because protein functionality requirements for wheat flour tortilla

differ from that required for good quality bread. The desirable protein network (gluten) for good quality tortilla production is extensible and mellow, while bread dough requires a strong, resilient gluten network to retain air bubbles during fermentation. The goal of the study was to evaluate the tortilla making properties of wheat lines possessing variations in the high molecular weight glutenin proteins that occur on each of the three (A, B and D) wheat genomes. Wheat lines in which one or more of the proteins were absent were used to make tortillas. The tortillas missing certain proteins had different quality in several parameters such as diameter, shelf stability and overall quality. This study shows that the variations in wheat protein can be identified and manipulated to produce a combination of flour protein profile and dough making attributes to produce wheat with optimum functionality for tortillas.

Contact Michael Tilley, telephone 785-776-2759, email Michael.Tilley@ars.usda.gov

Separation of Alcohol Soluble Sorghum Proteins Using Non-Porous Cation-Exchange Columns

Authors: D.L. Blackwell, S. Bean

Submitted to: Journal of Chromatography A

Kafirins, the storage proteins and major protein class of the cereal grain sorghum, play an important nutritional role for millions of people in parts of Africa and Asia. We developed a new method that improves the separation of the major kafirin type, the alpha kafirins. It is known that there are up to 19 different proteins that make up the alpha kafirins. However, the most common method for separating sorghum proteins, gel electrophoresis, is only capable of separating the alpha kafirins into two broad classes. The ion-exchange method that we developed shows improved resolution of the alpha kafirins and can be used to study the allelic variation of sorghum proteins and to identify which alleles show desirable traits such as improved protein digestibility.

Contact Scott Bean, telephone 785-776-2725, email Scott.Bean@ars.usda.gov

USDA-ARS Center for Grain and Animal Health Research

1515 College Avenue
Manhattan, KS 66502

800-627-0388
ars.usda.gov/npa/cgahr

