

Our Latest Research Results - August 2012

Susceptibility of White-Tailed Deer (*Odocoileus virginianus*) to Experimental Infection with Epizootic Hemorrhagic Disease Virus Serotype 7

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Submitted to: Journal of Wildlife Diseases
Epizootic hemorrhagic disease (EHD) viruses (EHDV) are insect-transmitted viruses of certain wild ruminants and cattle. In the US, EHD is one of the most significant infectious diseases of white-tailed deer, whereas infection in cattle is primarily subclinical, or rarely results in mild disease. However, in 2006, EHDV-7 caused widespread disease among Israeli dairy cattle herds, resulting in significant economic loss to that industry. This virus serotype (EHDV serotype 7) is not present in the U.S. and in order to better understand the potential for this virus to impact US populations of white-tailed deer and cattle, we performed an experimental infection of white-tailed deer with EHDV-7. The results demonstrate that white-tailed deer are susceptible to infection and disease with this exotic virus. The observed disease was severe, and indistinguishable from that caused by EHDV serotypes that are already present in the U.S. Thus, we showed that white-tailed deer are a potential North American host for this exotic, cattle-virulent strain of EHDV. If our native vector of EHDV (*Culicoides sonorensis*) is shown to be capable of transmitting EHDV-7, then it may be possible for this virus to circulate in North America if introduced. These findings are useful to diagnosticians, veterinarians, researchers, cattle producers, wildlife professionals and others involved in livestock and wildlife health and management.

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Phylogenetic Characterization of Bacteria in the Gut of House Flies (*Musca domestica* L.)

Authors: A.K. Gupta, D. Nayduch, P. Verma, B. Shan, H. Ghate, M.S. Patole, Y.S. Shouche

Submitted to: Federation of European Microbiological Societies Microbiology Letters
House flies live and breed in septic environments, and therefore have been implicated in the dissemination and transmission of bacterial diseases affecting humans and livestock. Some previous studies have used either molecular (PCR) or culture methods to detect pathogens

associated with flies, but likely have underestimated the presence of many microbes, especially those that are in low abundance, unculturable, or undetectable by standard molecular methods. The innovative approach of this study was to use, and compare, both molecular (culture-independent) and bacteriological (culture-dependent) techniques to detect strains of bacteria in house flies and thereby more accurately assess the diversity of microbiota in these insects. By sequencing a culture-independent library of PCR products, additional species not detected by culture were revealed, which helps in improving the detection of microbes in flies. Some species that were detected are important pathogens of humans and other animals. This provides further evidence that house flies serve as reservoirs, and possible vectors, of diverse bacteria that are of medical and veterinary importance.

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Spatio-Temporal Distribution of Stored-Product Pests around Food Processing and Storage Facilities

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Submitted to: Agriculture, Ecosystems and Environment

Stored-product insects can be found outside of facilities where grain is stored and processed, and these populations can potentially serve as a reservoir and source of food product infestation. Identifying the pattern of distribution of pest species and the factors that determine distribution could help in the targeting of monitoring and pest management programs. Pests were monitored using two types of food-baited traps at three food facilities, and the species captured were a mixture of both important grain and processed food pests and fungal feeding species more commonly associated with degraded grain. Although the types of insects captured were similar between inside and outside locations, more were captured per trap inside and fungal feeding species were proportionally more abundant outside. Features of the landscape around each outside trap were characterized to see which might predict locations with more insect activity. Increased captures in outside traps were primarily associated with proximity to buildings, but surprisingly not associated with presence of food spillage. Overall, there was evidence of considerable movement of insects in the landscape surrounding facilities, resulting in limited spatial pattern other than localized hot spots inside or near structures that varied

in location overtime. This study presents a methodology for evaluation of external populations at food facilities, highlights the importance of understanding pest populations over larger spatial scales, and provides insight into where monitoring and pest management tactics need to be focused.

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Tribolium castaneum (Coleoptera: Tenebrionidae) Associated With Rice Mills: Fumigation Efficacy and Population Rebound

Authors: K.A. Buckman, J.F. Campbell, B. Subramanyam

Submitted to: Journal of Economic Entomology

The red flour beetle is the most important insect pest infesting rice milling facilities in the U.S. While this pest has traditionally been managed by fumigation with methyl bromide, this fumigant is currently being phased out under the 1987 Montreal Protocol. The purpose of this study was to evaluate the effectiveness of sulfur dioxide (SF₆), an alternative to methyl bromide, in managing red flour beetle infestations in rice mills. Red flour beetle populations in and around seven rice mills were monitored before and after 25 fumigations with SF₆. Beetle populations were estimated by the number of adults captured in pheromone traps. The SF₆ fumigations led to an average of 66% reduction in captures of red flour beetle adults. Beetle captures at the rice mills were strongly influenced by seasonal changes in temperature, with more beetles being captured during the warmer months and fewer during the cooler months. In addition, red flour beetle captures in traps located inside mills were positively correlated with captures in traps located outside of the mill. Seasonal temperature fluctuations also strongly impacted the length of time required for captures to return to pre-fumigation levels. Similar studies in wheat flour mills did not share the seasonal patterns or correlation between captures inside and outside the mills. These results highlight the importance of treatment timing in maximizing fumigation efficacy in rice mills and suggest there is a fundamental difference in red flour beetle population dynamics and in the impact of fumigation between wheat and rice mills.

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Yield and Morpho-Agronomical Evaluation of Food-Grade White Sorghum Hybrids Grown in Southern Italy

Authors: P. Pontieri, P. DeVita, A. Boffa, M.R. Tuinstra, S. Bean, G. Krishnamoorthy, C. Miller, E. Roemer, P. Alifano, D. Pignone, D.R. Massardo, L. Del Giudice

Submitted to: Journal of Plant Interactions

Grain sorghum [*Sorghum bicolor* (L.) Moench] is a gluten-free grain that is gaining attention as a food crop that can be used in the management of celiac disease.

At present, sorghum is widely grown in many semiarid regions of the world. New food-grade sorghum cultivars are of particular interest in Mediterranean countries due to improved quality characteristics and gluten-free status of the grains. Until now very few studies have examined the grain yield and agronomic performance characteristics of food-grade sorghum hybrids in Italy. In general, early flowering hybrids were found to perform better than late flowering hybrids in southern Italy. These results will help the production of sorghum in Mediterranean regions.

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Presence of Tannins in Sorghum Grains is Conditioned by Different Natural Allels of Tannin1

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Submitted to: Proceedings of the National Academy of Sciences

Sorghum is an ancient cereal crop and a staple crop that feeds over 500 million people in more than 30 countries. It has drought resistance, wide adaptation, and high nutritional value and also is an energy crop. Condensed tannins in the pigmented seed coat of some sorghum cultivars may promote human health due to their high antioxidant capacity and ability to reduce obesity through reduced digestion. We cloned and verified the function of the gene, Tan1, that controls tannin biosynthesis in sorghum. This research opens the possibility of manipulating the levels and combinations of phenolic compounds in sorghum to promote better human health.

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