



Research Kernels

The Latest Research Results from CGAHR - December 2013

Molecular phylogenetic profiling of gut-associated bacteria in larvae and adults of flesh flies (*Sarcophaga* spp.)

Submitted to: Medical and Veterinary Entomology

Authors: A.K. Gupta, G. Rastogi, D. Nayduch, S.S. Sawant, R.R. Bhone, Y.S. Shouche

Flesh flies breed in decaying matter such as carcasses and rotting flesh. In these environments they are in contact with both pathogenic and non pathogenic microbes. Flesh flies also associate with humans and other animals and therefore are important in harboring and disseminating bacteria from septic to domestic habitats. This study aimed to characterize the diversity of bacteria species associated with both larvae and adult flesh flies using both a culture-based and culture-independent (molecular) approach. Bacteria cultured from larva and adult flesh fly guts belonged to the genera *Acinetobacter*, *Bacillus*, *Budvicia*, *Citrobacter*, *Dermacoccus*, *Enterococcus*, *Ignatzschineria*, *Lysinibacillus*, *Myroides*, *Pasteurella*, *Proteus*, *Providencia*, and *Staphylococcus*. Molecular approaches identified bacteria in the genera *Aeromonas*, *Bacillus*, *Bradyrhizobium*, *Citrobacter*, *Clostridium*, *Corynebacterium*, *Ignatzschineria*, *Klebsiella*, *Pantoea*, *Propionibacterium*, *Proteus*, *Providencia*, *Serratia*, *Sporosarcina*, *Weissella*, and *Wohlfahrtiimonas*. Many species within these genera are pathogens to humans and animals, thus bolstering the assessment of microbiological risk associated with the presence of these flies. This study establishes a platform for a much larger study that will assess microbial diversity in flesh flies from a wider geographic area and other environments.

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Demodectic Mange, Dermatophilosis, and Other Parasitic and Bacterial Dermatologic Diseases in Free-Ranging White-tailed Deer (*Odocoileus virginianus*) in the United States from 1975-2012

Authors: N. Nemeth, M. Ruder, R. Gerhold, J. Brown, B. Munk, P. Oesterle, S. Kubiski, K. Keel

Submitted to: Veterinary Pathology

White-tailed deer are a common and widespread species in North America. Unlike some diseases of wild animals with more cryptic symptoms, dermatologic diseases are often readily observed by hunters and

other wildlife enthusiasts and many of these cases are submitted for diagnostic investigation. The records of white-tailed deer diagnosed with a dermatologic disease that were submitted to the Southeastern Cooperative Wildlife Disease Study (University of Georgia) over a 37 year period were retrospectively examined. The majority of skin diseases were found to be caused by *Demodex* sp. (parasitic) or *Dermatophilus congolensis* (bacterial), but other less common pathogens included other bacteria, fungi, ectoparasites, and larval nematodes. The impact of these skin diseases on populations of white-tailed deer is likely minimal; however, due to their dramatic presentation, demodicosis, dermatophilosis, and other infectious skin diseases can be of concern to hunters and in some cases, may have zoonotic potential. This study furthers our understanding of some of the causes of infectious dermatologic disease of free-ranging white-tailed deer and will be of interest to wildlife managers, wildlife health professionals and veterinary pathologists.

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Effects of radio-transmitter methods on pileated woodpeckers: an improved technique for large woodpeckers

Authors: B.L. Noel, J.C. Bednarz, M.G. Ruder, M.K. Keel

Submitted to: Southeastern Naturalist

As part of a study to better understand the ecology of pileated woodpeckers in Arkansas bottomlands, 64 birds were captured and radio-marked over a three-year period. Capture-related mortality was higher than an acceptable level during the first trapping season, so adjustments to the capture methods were made. Radio-transmitter attachment techniques were transitioned from a figure-eight harness to a tail-mounted unit, and handling times were reduced to minimize stress. For the duration of the study, all radio-marked birds captured over the next two field seasons survived. The findings of the study suggest that pileated woodpeckers, and perhaps other large woodpeckers, have an increased risk of capture-associated death when tagged with figure-eight harnesses and are handled for longer periods and more obtrusively. This report makes important recommendations on capture and

handling methodology that researchers, biologists, and ornithologists can use to minimize adverse impacts on birds during future research.

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Distribution, abundance, and seasonal patterns of stored product beetles in a commercial food storage facility

Authors: F.H. Arthur, J.F. Campbell, M.D. Toews

Submitted to: Journal of Stored Products Research
Several beetle species can be major pests of stored food products, but there are few studies where resident populations have been monitored for more than one year in commercial facilities. We monitored beetle populations in a food warehouse for three years using attractants. The focal points of infestation shifted during the storage period, but beetles were found even in areas of the warehouse where no food products were stored. Specific sites were identified where beetles were most prevalent. Actual numbers of beetles fluctuated depending on the amount and location of goods in the warehouse, and also show that the movement of goods into and out of the warehouse affected insect populations. Results demonstrate how targeted monitoring of insect pests can aid in making management decisions, while taking into account the dynamic nature of insect infestations inside active commercial facilities.

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Fusarium head blight resistance in U.S. winter wheat cultivars and elite breeding lines

Authors: F. Jin, D. Zhang, W. Bochus, P. S. Baenziger, B. Carver, G. Bai

Journal:

Fusarium head blight (FHB), also called scab, is a destructive disease of wheat worldwide. In the Great Plains, FHB epidemics are becoming more frequent and severe. Growing resistant cultivars is one of the effective strategies to reduce damage by FHB. To characterize FHB resistance in U.S. wheat germplasm, we analyzed 363 U.S. winter wheat accessions for FHB resistance in both greenhouse and field experiments. The majority of tested accessions were either moderately or highly susceptible; only 6-7% of the accessions showed a high level of resistance. We found that near-isogeneic line carrying *Fhb1*, a FHB resistance gene from Suma3 (a Chinese line) showed significant higher levels of resistance than their recurrent parents. Also some resistant lines without *Fhb1* also showed a high level of resistance and they may contain genes different from *Fhb1*. Thus, transferring *Fhb1* into most US wheat cultivars may significantly improve FHB resistance and accessions without *Fhb1* that showed consistent

resistance may be good sources for stacking native resistance genes from U.S. wheat with *Fhb1*.

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Impact of Temperatures to Hessian Fly Resistance of Selected Wheat Cultivars in the Great Plains Region

Authors: M.S. Chen, S. Wheeler, H. Wang, R.J. Whitworth

Submitted to: Journal of Economic Entomology
The Hessian fly is a major pest of wheat and is mainly controlled using resistant wheat cultivars. However, the host resistance strategy is overall less successful in the southern U.S. In this study, we discovered that different temperatures have a profound impact on Hessian fly resistance in selected wheat cultivars from the U.S. Great Plains. Many wheat cultivars that are fly-resistant at 20 °C become susceptible at higher temperatures, and many other cultivars that are fly-susceptible at 20 °C, including popular cultivars 'Bill Grown', 'Byrd', 'Endurance', 'Fuller', 'GA-031257-10LE34', and 'KS09H19-2-3' become resistant at a certain lower temperature, depending on different cultivars. This finding is significant in several respects. First, this information is important for wheat growers to make decision according to historical temperatures in their regions. Second, the loss of fly-resistance in wheat plants at higher temperatures poses a threat for future success of the host resistance strategy due to global climate change. Third, many cultivars were classified as fly-susceptible according to standard screening criteria are actually resistant at historical average temperatures in the Great Plains area during wheat growing seasons. The impact of wheat cultivars with fly-resistance at low temperatures on Hessian fly population changes in the field needs to be evaluated.

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