

7<sup>th</sup> Annual  
Capitol Graduate Research Summit

ABSTRACTS

Featuring

# Kansas State University

Presenter

Brandon Bortz

Moses Khamis

Ben Wileman

Abstract Title

Long-Term Salt Scaling Durability Of Concrete Containing Fly Ash

Flameless Catalytic Infrared Radiation For Disinfestation Of Stored Wheat Does  
Not Affect Wheat Quality

Passive Immunity To A

# The University of Kansas Medical Center

Presenter

Abstract Title

Effect Of Voluntary Exercise On Mechanical



# **KANSAS STATE UNIVERSITY**

## **LONG-TERM SALT SCALING DURABILITY OF CONCRETE CONTAINING FLY ASH**

*Brandon Bortz\**

*Department of Civil Engineering, College of Engineering, Kansas State University*

Fly ash is a by-product of coal-fired power plants. This material can be used as a partial cement substitute in Portland cement concrete. The use of fly ash is environmentally beneficial by making use of an industrial by-product that would otherwise be



**ANATOMICAL AND PHYSIOLOGICAL TRAITS AS INDICATORS OF  
DROUGHT TOLERANCE IN TALLGRASS PRAIRIE PLANTS**

*Sally Tucker\**

*Department of Biology, College of Arts and Science, Kansas State University*

Konza Prairie contains over 550 vascular plant species, of which, few have been closely studied. Predicted impacts of climate change on the tallgrass prairie region increase the importance of understanding how native tallgrass prairie species are likely to respond to future changes in water availability and increased air temperatures. Understanding which traits are the best predictors of relative abundance along a continuum of water availability will aid in the prediction of plant community structure under altered temperature-precipitation regimes. In this research, both anatomical and physiological measurements were taken on nearly 120 species of herbaceous tallgrass prairie plants grown from seed in a growth chamber. Gas exchange measurements including photosynthetic rate and stomatal conductance were taken under optimal light, temperature, and humidity conditions. All plants were exposed to a dry-down period and were monitored until conductance fell to zero. At this point, water potential ( $\psi_{crit}$ ) was measured and the plants were harvested to measure root length, diameter, and volume, leaf area, leaf tissue density, root tissue density, and root: shoot ratio. Traits were compared using pair-wise bivariate analyses and principal component analyses (PCA). Clear differences were detected in the PCA between grass and forb functional groups. The rotated factor pattern suggested a dichotomy between



## DEVELOPING SITE-SPECIFIC MONITORING STRATEGIES FOR MANAGING CORN EARWORM (*HELICOVERPA ZEA*) IN SORGHUM

*Alysha Soper\**

*Department of Entomology, College of Agriculture, Kansas State University*

Corn earworm (*Helicoverpa zea*: Noctuidae) is an annual, late-season sorghum pest in Kansas. Predicting abundant or damaging populations is difficult due to landscape complexity at regional (adult migration events) and local scales (host-plant shifts to crops like corn or soybean). The sampling threshold for insecticide application is 2-3 corn earworm larvae per sorghum head, or the equivalent of up to 25% yield loss. Decisions regarding treatment will directly affect total grain production, profits, and may unintentionally affect non-target organisms. Therefore, it is imperative that user-friendly and cost-effective sampling methods exist to minimize the chance of making incorrect management decisions. Current management recommendations and monitoring practices include weekly, whole-field samples from the flowering stage to maturity using traditional sampling patterns. The objectives of this research are to 1) define reduced sampling area (field borders vs. whole-field) that can accurately estimate larval infestations based on geospatial distributions, and 2) test the efficacy of pheromone traps in identifying temporal sampling strategies based on adult migration and host phenology. Preliminary field data show that surrounding crop type (corn or soybean) along with regional variation in pheromone trap catches impact spatial and temporal colonization patterns at the field-level. Future research will continue to focus on larval spatial distributions along with adult flight activity in order to develop refined sampling recommendations and to understand the implications for site-specific management of corn earworm in sorghum.

**Benefit:** Kansas is historically an agricultural state and follows only Texas and Montana in total agricultural acreage. It is a leading producer of sorghum, which is sold as grain and silage feed for livestock and is increasingly used in the production of biofuels. Corn earworm is a common pest of sorghum across the state and can reduce yields by as much as 25%. Refinement of current sampling patterns holds great promise for maximizing yield potentials and reducing costs associated with unnecessary insecticide application. Understanding the spatial and temporal colonization patterns and the influence of alternative host-crops on the distribution of corn earworm moths can help us develop user-friendly and cost-effective site-specific management strategies for sorghum grower 1 54.060 612 792 re54.02%00000912 0 612 792 reW\*ñBT/F1 190 Tf1 0 0 1 356.15 46

free technologies to produce ammonia thermochemically could be an outstanding example demonstrating the evolving energy and environmental policies in the U.S.





## **THE SIGNIFICANCE OF OUTDOOR ENVIRONMENTS FOR DUAL SENSORY IMPAIRED PERSONS**

*Kala Ade\**

*Department of Architecture, College of Architecture, Kansas State University*

Experiencing nature, whether it is through gardening or a nature walk, elicits a calming or centering experience (Marcus & Barnes, 1999; Ulrich, 1986). Such therapeutically beneficial human responses to nature are observed in the very young to the very old and by those with sensory impairments (Rodiek & Schwarz, 2003). Ulrich showed that nature could have beneficial effects on the physical, emotional and spiritual well



## **ENHANCING FATIGUE LIFE OF STEEL BRIDGES THROUGH COMMON RETROFIT TECHNIQUES**

*Heidi Hassel\**

*Department of Civil, Environmental and Architectural Engineering, The University of Kansas*

Steel bridges built prior to the mid-1980s were often constructed with fatigue susceptible connection details, which have resulted in bridge girders with localized cracking or at high risk of developing cracks due to distortion-induced fatigue. Bridge engineers throughout the county are working to implement repair and retrofit techniques in order to extend the fatigue life of such bridges. This research included an investigation of four commonly used retrofit techniques that modify or eliminate the problematic connection detail between girders and lateral bracing elements. Retrofits techniques consisted of positive attachment, back-up transverse stiffeners, slotted connection stiffeners, and interior cross frame removal. Extensive finite element analysis of an entire bridge was utilized to numerically predict effectiveness. Results are presented showing



**BIOENGINEERING TOOLKITS FOR 4<sup>TH</sup> AND 5<sup>TH</sup> GRADE TEACHERS**

*Erin Lewis \**

*Department of Mechanical Engineering, The University of Kansas*

“BET 4 Teachers” is an NSF Research Experience















**ECOLOGICAL PERSPECTIVES OF LATINO/HISPANIC FAMILIES  
IN A RURAL SCHOOL COMMUNITY**

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