

NCCC-170
Research Advances in Agricultural Statistics
Annual meeting held at University of Nebraska Lincoln
July 17-18, 2014

Official Members Present: John Aleong (VT), Nora Bello (KS), Bruce Craig (IN, Admin.), Susan Durham (UT), Ed Gbur (AR), Carla Goad (OK), Raul Macchiavelli (PR), Larry Madden (OH), Bahram Momen (MD), Bahman Shafii (ID), Walt Stroup (NE)

Official Members Absent: German Bollero (IL), Don Bullock (IL), Xin Dai (UT), Sara Duke (USDA-ARS), Mark Hinds (Pioneer Hi-Bred), Ken Koehler (IA), Kevin McCarter (LA), David Meek (USDA retired), Margaret Nemeth (Monsanto retired), Dan Schmoldt (USDA, Admin.), Julia Sharp (SC), Rob Tempelman (MI), Mark West (USDA-ARS), Kathy Yeater (USDA-ARS), Linda Young (FL), Jun Zhu (WI)

Others Present: Jennifer Clarke (NE), Nick Keuler (WI), Matt Kramer (USDA-ARS), George Milliken (KS), Dan Nettleton (IA), Gayla Olbricht (MO Sci&Tech)

2014 Officers: Ed Gbur, Chair; Susan Durham, Secretary; Bahman Shafii, Program Chair; Walt Stroup, Local Arrangements

NCCC-170 Website: <http://www.uark.edu/misc/ncr170/>

Minutes:

Technical program: The meeting began at 8:30 a.m. on Thursday, July 17, 2014 with opening remarks by Walt Stroup and Archie Clutter (Dean/Director of Agricultural Research Division, UNL). Presentations ended at approximately 5:00 p.m. The technical program consisted of the following presentations.

Jennifer Clarke	The new reality of Big Data
Bahram Momen	Non-linear mixed model analysis of photosynthetic-light responses to N and Ca additions
Dan Nettleton	Using quasi-likelihood analysis of RNA-Seq data to identify differentially expressed genes
Gayla Olbricht	Exploratory analysis of sleep and wake bouts in <i>Drosophila melanogaste</i>
Matthew Kramer	A new general diagnostic/goodness-of-fit tool for GLMMs
Nora Bello	A hierarchical Bayesian approach to assess fit of generalized linear mixed models
Walt Stroup	Fixed/random block effect dilemma, edition 64+. Valid caution or die-hard urban legend?
Bahman Shafii	Bayesian approaches for estimation of an unknown dose

Business meeting: The business meeting began at 9:10 a.m. on Friday, July 18, 2014. Ed Gbur presided. The following items were discussed:

- (1) Ed Gbur thanked several people for organizing a productive and enjoyable meeting: Walt Stroup for local arrangements; Bahman Shafii for the technical program; Ellen Paparozzi and Walt Stroup for the cookout/mixer at their home; Stacy Herceg for support and refreshments.
- (2) The annual report and impact statement are due shortly after the annual meeting. Participants need to send Ed Gbur (egbur@uark.edu) accountings of all activities (workshops, papers, presentations,

grants, teaching related items, etc.) from October 1, 2013 to September 30, 2014 (or since last year's report) that are related to or inspired by their participation in NCCC-170 as soon as possible.

- (3) The 2015 meeting will be held in Mayagüez, Puerto Rico on June 25-26 with Raul Macchiavelli as host. This will be a joint meet with USSES (SCC-013). After some discussion, Mayagüez was chosen as the location over San Juan. Bahman Shafii will serve as program chair. Bahram Momen is the USSES program chair. The 2016 meeting is set for Maryland with Bahram Momen serving as the host. The 2017 meeting is tentatively planned for Arkansas.
- (4) Ed Gbur noted that we successfully navigated the mid-term review and that NCCC-170 has been approved to continue through 2016. The notification letter is posted on the project website under this year's meeting.
- (5) The group reviewed progress toward the goals identified at the 2013 meeting. The mixed model workshop materials have been updated and expanded to include generalized linear mixed models and the use of new software. The focus of the genomics workshops has shifted to more current topics and continues to evolve over time. Anyone interested in participating in this endeavor should contact Kathy Yeater. Goals for the next three years were revised based on the discussion.
- (6) As part of Kathy Yeater's project on "Statistics Workshops for Regional Meetings and Web-Based Platforms" that she is facilitating for the American Society of Agronomy, Carla Goad discussed the web based introductory course that Julia Sharp taught and the experimental design/ANOVA course that she taught. Both courses were well received by society members.

As part of the same project, Kathy is looking for volunteers to develop a short course for the Society that introduces the use of statistical analyses in R. Anyone interested should contact Kathy. Carla and Kathy both indicated that there are financial incentives related to this project's participants.

- (7) Nora Bello invited project members to become involved in the mixed model workshops presented at the annual Animal Sciences meetings. Next year's workshop is July 15-16, 2015 in Orlando. Presenter travel and housing expenses are covered by the Society. The workshops have been well attended with an average of about 80 participants each time it has been presented. Bruce Craig noted that he can make workshop materials available to project participants. The materials can be used with proper acknowledgment of NCCC-170.
- (8) The group discussed the issue of remote access participation. Nora Bello volunteered to purchase a good quality microphone and noted that she has access through KSU to Zoom software for facilitating remote participation. Members agreed that there should be a reduced registration fee of \$10 for remote participation, with funds being used to reimburse expenses such as the microphone purchase.
- (9) Nora Bello solicited suggestions about a topic and speaker for the 2015 Conference on Applied Statistics in Agriculture at Kansas State. She was also interested in input on ways to increase attendance at the conference. Nora encouraged people to send ideas and in particular would welcome statements of support for an alternative date as a way to increase attendance.

The meeting adjourned at approximately 10:55 a.m. A group photograph for the project web site was taken immediately afterward.

Accomplishments: Statisticians who consult and do research in an Agricultural Experiment Station environment enable land grant institutions to perform their agricultural research missions more effectively and efficiently than would otherwise be possible. However, most stations have at most one or two

professional statisticians who are not, and cannot be expected to be, experts in every area of statistics. This multi-state committee brings together statisticians to work cooperatively to determine the best current approaches to common statistical problems and to help guide future directions of sound statistical practice. In addition to producing group outputs such as workshops, the committee serves as a resource for its members and a sounding board for new ideas in their applied statistical research. As a result, all members are able to provide more effective assistance to agricultural researchers addressing national research priorities than they would without NCCC-170.

Outputs:

Workshops:

Bruce Craig, Jun Zhu and Nora Bello presented a one and a half day workshop on the application of general and generalized linear mixed models to research problems in the animal and food sciences at the joint annual national meetings of the American Dairy Science Association and the American Society of Animal Sciences. There were approximately 80 participants.

Raul Macchiavelli, J. Di Rienzo and F. Casanoves taught a 40 hour short course entitled “Advanced Statistical Modeling: Mixed Models Applications”, at CATIE (Tropical Agronomic Center for Research and Teaching) in Turrialba, Costa Rica in August 2014.

Larry Madden presented a workshop entitled “An introduction to meta-analysis for the synthesis of evidence” at the University of Salzburg in Salzburg, Austria in July 2014.

Larry Madden presented a workshop entitled “Introduction to Bayesian analysis in plant pathology” at the annual meeting of the American Phytopathological Society (APS) in Minneapolis in August 2014.

Sara Duke and Kathy Yeater presented a workshop entitled “Aquaculture Statistics Workshop – Multivariate Statistics” at Aquaculture America 2014 in Seattle, WA in February 2014.

Kathy Yeater facilitated the program “Statistics Workshops for Regional Meeting and Web-Based Platform” for the American Society of Agronomy. Two short courses have been developed and presented once, each consisting of 4 weekly 2 hour sessions using a distance learning platform. Julia Sharp developed and instructed “Introductory Statistics Refresher Course” and Carla Goad developed and instructed “Introduction to Experimental Design and Analysis.”

Presentations:

Nora Bello. “Inferring upon heterogeneous associations in dairy cow performance using a bivariate hierarchical model” at the International Biometric Conference in Florence, Italy in July 2014. *(Invited)*

Nora Bello, J. P. Steibel and Rob Tempelman. “Accounting for heterogeneous pleiotropy in whole genome selection models” at the 2013 Joint Annual Meeting of the American Dairy Science Association and the American Society of Animal Science in Indianapolis in July 2013. *(This presentation was one of 30 selected out of 2,200 abstracts submitted for the American Society of Animal Science Presidential Pick. Selection criteria included scientific merit and overall interest.)*

Bruce Craig and Z. Hass. “Developing prediction equations for carcass lean mass in the presence of proportional measurement error” at the the Kansas State University Conference on Applied Statistics in Agriculture in April 2014.

Z. Ou, Rob Tempelman, J. P. Steibel, C. Ernst, R. Bates and Nora Bello. “Genomic prediction accounting for residual heteroskedasticity” at the Kansas State University Conference on Applied Statistics in Agriculture in April 2014.

J. Schroeder, Walt Stroup and Nora Bello. “Hierarchical Bayesian implementation of generalized linear mixed models for count data” at the Kansas State University Conference on Applied Statistics in Agriculture in April 2014.

Saunders G., Fu G., and John Stevens. “A Hierarchical Weighted-Bonferroni Multiplicity Correction in Linkage Disequilibrium Based QTL Mapping” at the Kansas State University Conference on Applied Statistics in Agriculture in April 2014.

John Stevens, Ganesan B., Lefevre M., and Weimer B.C. “SigTree: Identifying and Visualizing Significantly Responsive Branches in a Phylogenetic Tree” at the Kansas State University Conference on Applied Statistics in Agriculture in April 2014.

Matt Kramer. “Use of the posterior predictive distribution as a diagnostic tool for mixed models” at the Kansas State University Conference on Applied Statistics in Agriculture in April 2014.

Nora Bello. “Heterogeneous Pleiotropy in Whole-Genome Selection Models” at departmental seminars for the Departments of Statistics and Animal Science at the University of Nebraska in November 2013.

Nora Bello. “Heterogeneous Pleiotropy in Whole-Genome Selection Models” at the Bioinformatics Seminar, Department of Statistics at Purdue University in November 2013.

Taylor, I., Julia Sharp,, White, D. L., Hallstrom, J. O., von Oehsen, J. B., Duffy, E., Eidson, G., Privette, C., Cook, C. T., Sampath, A., Radhakrishnan, G. “Monitoring Sensor Measurement Anomalies of Streaming Environmental Data Using a Local Correlation Score” at the 4th International Conference on Computing for Geospatial Research & Application in San Jose, CA in July 2013.

Drennan, K., Wiesinghe, D., White, S., White, D., Menchyk, N., Julia Sharp, Vincent, E. and Park, D.M. “Soil Temperature and Moisture Differentials from Concrete Sidewalks” at the 14th American Ecological Engineering Society Meeting in Charleston, SC. in June 2014.

Larry Madden. “The cost of plant disease prediction” at Pennsylvania State University in April 2014.

Larry Madden. “Predicting plant diseases: A case study with Fusarium head blight of wheat” at Cornell University in Geneva, NY and in Ithaca, NY in May 2014.

J. Gaffney, M. Galliard, S. Sabates, S. Baer, B. Maricle, E. McCrea, Nora Bello and L. C. Johnson. “Variations in polyploidy in big bluestem (*Andropogongerardii*) ecotypes across the Great Plains” at the annual meeting of the Botanical Society of America, Boise, Idaho in July 2014.

M. Galliard, L. Johnson, S. Sabates, H. Tetreault, A. DeLaCruz, J. Bryant, T. J. Morgan, M. Knapp, Nora Bello, S. G. Baer, D. Gibson, L. Wilson, B. R. Maricle. “Adaptive potential and trait variation of a widespread grass *Andropogongerardii* across a Great Plains climate gradient: Implications for climate change” at the annual meeting of the Botanical Society of America, Boise, Idaho in July 2014.

J. Craver, C. Miller, K. Williams and Nora Bello. “UVB radiation affects intumescence development in *Ipomoea batatas* (ornamental sweet potato)” at the American Society for Horticultural Science annual conference in Orlando, Florida in July 2014.

Raul Macchiavelli. “Nonlinear mixed models for disease incidence and severity: Modelling plant diseases in tropical crops” at the 59th World Statistics Congress in Hong Kong (China) in 2013. *Information Bulletin* 2, 149. <http://www.statistics.gov.hk/wsc/IPS105-P2-S.pdf>

Casanoves, F., M. Nime, Raul Macchiavelli, C. Mattoni. “Application of generalized linear models to study the surface activity of scorpions” at the 59th World Statistics Congress in Hong Kong (China) in 2013. *Information Bulletin* 2, 135.

Mark West. “Generalized Linear Mixed Models: Seeking Better Inferences” at a symposium for “Advanced Statistical Approaches to Reach Strong Inferences from Agronomic and Environmental Studies” at the Tri-Societies (ASA-CSA-SSSA) annual meeting in Tampa, FL in November 2013.

Di Rienzo, J.; Raul Macchiavelli; F. Casanoves. “New functionalities for the InfoStat interface to LME4 library” at the XXVIIth International Biometric Conference in Florence, Italy in July 2014.

Torres-Saavedra, P.; Raul Macchiavelli. “Mixed Beta Regression with Penalized Splines For Disease Severity” at the XXVIIth International Biometric Conference in Florence, Italy in July 2014.

Macchiavelli, Raul. “Uso de Modelos Estadísticos para Combinar Información Longitudinal y Transversal en Estudios Forestales: Aplicaciones de Modelos no Lineales Mixtos en Curvas de Índice de Sitio para teca” at the X Congreso Internacional de Investigación Científica (X CIC) at the Universidad Autónoma de Santo Domingo, Dominican Republic in June 2014.

Momen, Bahram. “Use of nonlinear mixed regression models in factorial experiments involving repeated measurements.” Annual meeting of SCC-013 (USSES) at Clemson University in June 2014.

Momen, Bahram., Behling S., Sullivan J.H., Lawrence G.B. “Non-linear mixed model analysis of photosynthetic-light response of sugar maple to calcium and nitrogen addition in the Catskills Mountain, NY.” At the Ecological Society of America annual meeting in Sacramento, CA.

Craig. Bruce. “Sample size/power calculations” at the Department of Psychology weekly clinical symposia and at the Ingestive Behavior Research Center (IBRC) at Purdue University.

Craig. Bruce. “Linear mixed models and repeated measures” at the Ingestive Behavior Research Center (IBRC) at Purdue University.

Other project related activities:

Nora Bello received a President’s Faculty Development Award from the Office of Research and Sponsored Programs, Kansas State University, in partial support for professional travel to present the 2012 winner of the “Best Paper in JABES by an IBS Member” at the International Biometric Conference in Florence, Italy in July 2014. (\$4,500)

Nora Bello is a co-PI on a grant from Micronutrients entitled “The effects of SID Lysine and Intellibond C (TBCC) feeding strategy in finishing pigs on growth performance, carcass characteristics and economics” with PI Steve Dritz, College of Veterinary Medicine, Kansas State University. The award period is 2014-2015. (\$25,000)

Nora Bello is a co-PI on a grant from Morris Animal Foundation entitled “The effects of ophthalmic prednisolone and diclofenac on diabetes mellitus regulation in dogs” with PI Amy Rankin, College of Veterinary Medicine, Kansas State University. The award period is 2014-2015. (\$35,000)

John Stevens is a co-PI on a grant entitled “Genome reprogramming and embryo survivability in porcine somatic cell nuclear transfer embryos” with PIs C. Isom and A. Benninghoff from USDA (USDA-NIFA-AFRI-003958). The award period is 2013-2016. (\$484,266)

Larry Madden maintains a website with SAS code and instructions for many statistical analyses, especially for mixed-model analyses at the Ohio State University. <http://oardc.osu.edu/APS-statsworkshop/default.htm> .

Bahram Momen credits NCCC-170 in improving the content of his graduate course in experimental design and advanced statistical analysis (BIOM602) course at the University of Maryland and in his consulting and mentoring of graduate students and faculty.

Specific goals for the next three years: (1) Educate project members in statistical issues and methodology related to statistical problems related to new complex data types collected on relatively few experimental units. Application areas include precision agriculture, chemometrics, metagenomics, and phenotyping. (2) Continue to offer updated and expanded mixed model and generalized linear mixed model workshops upon request from subject matter groups. (3) Develop web-based educational materials and workshops for agricultural scientists.

Impacts:

- (1) NCCC-170 fosters research to identify and develop statistical methodology applicable to agricultural research and provides a forum for sharing and educating both statisticians and subject-matter scientists in the agricultural, environmental and natural sciences. As a result, all members are able to provide more effective assistance to agricultural researchers addressing national research priorities than they would be without NCCC-170.
- (2) Project members provide continuing education for scientists in agriculturally related disciplines in modern statistical analyses of designed experiments in general and specifically in the areas of generalized linear mixed models and statistical techniques in genomics applications. Examples of such activities and their immediate impacts for the current reporting period are listed in the Accomplishments section of this report.
- (3) Project members collaborate in research projects with scientists in agricultural related disciplines to develop and use proper statistical design and analysis methodology well beyond standard textbook applications. These efforts often result in competitive grant participation and refereed publications. Each of these impacts is listed in the Accomplishments and Publications sections of this report.

Publications:

Allbaugh, R., S. Keil, Z. Ou and N. M. Bello. 2014. “Intraocular pressure changes in equine athletes during endurance competitions”. *Veterinary Ophthalmology*. 17, Suppl.1, 154-159. DOI: 10.1111/vop.12182.

Bello, N. M., J. P. Steibel, R. J. Erskine and R. J. Tempelman. 2013. “Cows and herds constitute distinct hierarchical levels of heterogeneity in the variability of and association between milk yield and pregnancy outcome in dairy cows.” *Journal of Dairy Science* 96 (4):14-26.

Bryant, R.J., A.K. Jackson, K.M. Yeater, W. Yan, A.M. McClung, and R.G. Fjellstrom. 2013. “Genetic Variation and Association Mapping of Protein Concentration in Brown Rice Using a Diverse Rice Germplasm Collection”. *Cereal Chemistry* <http://cerealchemistry.aaccnet.org/doi/abs/10.1094/cchem-09-12-0122-R>.

Carroll JF, Kramer M, Bedoukian RH. 2014. "Solvent, drying time, and substrate affect the responses of lone star ticks (Acari: Ixodidae) to the repellents deet and picaridin". *Journal of Medical Entomology* 51: 629-637.

Cernicchiaro, N., D. Renter, S. Xiang, B. J. White and N. M Bello. 2013. "Hierarchical Bayesian modeling of heterogeneous variances in performance of commercial feedlot cattle." *Journal of Animal Science* 91 (6): 2910-2919.

Davidson, J.B., S.L. Durham, and P.G. Wolf. 2014. "Breeding system of the threatened endemic *Primula cusickiana* var. *maguirei* (Primulaceae)". *Plant Species Biology* (in press).

Eizenga, G.C., L.M. Ali, R.J. Bryant, K.M. Yeater, A.M. McClung, and S. McCouch. 2013. "Registration of the 'Rice Diversity Panel I' Genome_Wide Association Mapping Studies". *Journal of Plant Registrations*: 8:109-116.

Fallahi, E., B. Fallahi, B. Shafii, Z. Zamani. 2014. "Long-term yield and harvest time fruit quality attributes in various Fuji apple strains." *Horticultural Science* 49(3): 281–284.

Feldlaufer, MF, Ulrich, KR, Kramer, M. 2013. "No Sex-Related Differences in Mortality in Bed Bugs (Hemiptera: Cimicidae) Exposed to Deltamethrin, and Surviving Bed Bugs Can Recover". *Journal of Economic Entomology* 106(2): 988-994.

Fu G., Saunders G., and Stevens J.R. 2014. "Holm multiple correction for large-scale gene-shape association mapping". *BMC Genetics* (Suppl 1): S5.

Holt, E.A., B. Fagerheim, and S. Durham. 2014. "Online plagiarism training falls short in biology classrooms". *CBE—Life Sciences Education* 13: 83-89.

Imai, I., J.A. Kimball, B. Conway, K.M. Yeater, S.R. McCouch, and A.M. McClung. 2013. "Validation of yield enhancing QTLs from a low-yielding wild ancestor of rice". *Molecular Breeding*: 32(1):101-120.

Kaume, L., E.E. Gbur, R. DiBrezzo, L.R. Howard and L. Devareddy (2014). Antioxidant rice berries exert modest bone protective effects in postmenopausal smokers without improving biomarkers of bone metabolism. *Journal of Functional Foods* 9: 201-210.

Kulmatiski A., Anderson-Smith A., Beard K., Doucette-Riise S., Mazzacavallo M., Monal N., Ramirez R. and Stevens J.R. 2014. "Most soil trophic guilds increase plant growth: a meta-analytical review". *Oikos*. (In press)

Klun, JA, Kramer, M, Debboun, M. 2013." Four simple stimuli that induce host-seeking and blood-feeding behaviors in two mosquito species, with a clue to DEET's mode of action". *Journal of Vector Ecology* 38: 143-153.

Larrabee, B., H. M. Scott and N. M. Bello. 2014. "Ordinary least squares regression of ordered categorical data: Inferential implications." *Journal of Agricultural, Biological and Environmental Statistics*. DOI: 10.1007/s13253-014-0176-z.

Lass, L.W., S. P. Cook, B. Shafii, and T. S. Prather. 2014. "Development of a dispersal model for balsam woolly adelgid, *Adelges piceae* Ratzeburg (Hemiptera: Adelgidae), to facilitate landscape-level management planning." *International Journal of Forestry Research*. Vol. 2014: Article ID 519010. 8 pp.

Messina, F.J. and S.L. Durham. 2013. "Adaptation to a novel host by a seed beetle (Coleoptera: Chrysomelidae: Bruchinae): effect of source population". *Environmental Entomology* 42(4): 733-742.

Mikhailova, E.A., D.J.R. Cherney, L.U. Snyder, S.M. Kelly, C.J. Post, J.L. Sharp, and S.K. Cox. 2013. "Evaluation of nutritive value of *Pueraria montana* (kudzu) during the drought-prone growing season". *Communications in Soil Science and Plant Analysis* 44: 1-11.

Minshall, G.W., B. Shafii, C. Holderman, W.J. Price, P. J. Anders, G. Lester, and P. Barrett. 2014. "Effects of nutrient replacement on benthic macroinvertebrates in an ultra-oligotrophic reach of the Kootenai River, 2003-2010." *Freshwater Science* (In press).

Momen B, Behling S, Sullivan JH. 2014. "Non-linear modeling of photosynthetic response of sugar-maple mature trees and seedlings to calcium and nitrogen additions in the Catskills Mountains, NY." *JSM Environmental Science and Ecology* (In press).

Naoumkina, M.A., G.N. Thyssen, D.D. Fang, D.J. Hinchliffe, C.B. Florane, K.M. Yeater, J.J. Page, and J.A. Udall. 2014. "The Li2 mutation results in reduced subgenome expression bias in elongating fibers of allotetraploid cotton (*Gossypium hirsutum* L.)". *PLoS One*: 9(3):e90830.

Norswothy, J.K., G. Griffith, T. Griffin, M. Bagavathiannan and E.E. Gbur (2014). In-field movement of glyphosate resistant Palmer Amaranth and its impact on cotton lint yield – Evidence for a zero threshold. *Weed Science* 62: 237-249.

Norsworthy, J.K., M.J. Wilson, R.C. Scott and E.E. Gbur (2014). Herbicidal activity on acetolactate synthase-resistant barnyardgrass (*Echinochloa crus-galli*) in USA rice. *Weed Biology and Management* 14: 50-58.

Phillips PL, Welch JB, Kramer M. 2014. "Development of a spatially targeted field sampling technique for the southern cattle tick, *Rhipicephalus microplus*, by mapping white-tailed deer, *Odocoileus virginianus*, habitat in South Texas". *Journal of Insect Science* 14(88).

Pinson, S.R., L. Tarpley, W. Yan, K.M. Yeater, M. Zhang, M. Geurinot, and D.E. Salt. 2014. "Diversity for concentrations of mineral nutrients and trace elements in rice grains". *Crop Science* doi:10.2135/cropsci2013.10.0656.

Pirk CWW, de Miranda JR, Kramer M, Murray TE, Nazzi F, Shutler D, van der Steen JJM, van Dooremalen C. 2013. "Statistical guidelines for *Apis mellifera* research". *Journal of Apicultural Research* 52(4). doi 10.3896/IBRA.1.52.4.1.

Rawal S., Bauer M.M., Mendoza K.M., El-Nezami H., Hall J.O., Kim J.E., Stevens J.R., Reed K.M., and Coulombe R.A. 2014. "Aflatoxicosis Chemoprevention by Probiotic *Lactobacillus* and its Impact on BG Genes of the Major Histocompatibility Complex". *Research in Veterinary Science*. (In press)

Reid-Bush, T., L. Bix, N. M Bello and J. Fair. 2013. "Differences in kinematics of restrained and unrestrained conditions of opening for two sizes of glass jars." *Packaging Technology and Science* 26:105-113.

Rogers, C.W., K.R. Brye, A.D. Smartt, R.J. Norman, E.E. Gbur and M.A. Evans-White (2014). Cultivar and previous crop effects on methane emissions from drill-seeded, delayed flood rice production on a silt loam soil. *Soil Science*, 179, 28-36.

- Shafii, Bahman, W.J. Price, T.S. Prather and L.W. Lass. 2014. "Modeling dispersal of yellow starthistle in the canyon grasslands of northern Idaho." *International Journal of Plant Biology and Research* 2(2):1011.
- Shah, Binay K., A. Bista and B. Shafii. 2014. "Disparities in receipt of radiotherapy and survival by age, sex and ethnicity among patients with Stage I Diffuse Large B-Cell Lymphoma." *Leukemia & lymphoma* (In press).
- Shah, D.A., Molineros, J.E., Paul, P.A., Willyerd, K.T., Madden, L.V., and De Wolf, E.D. 2013. "Predicting Fusarium head blight epidemics with weather-driven pre- and post-anthesis logistic regression models." *Phytopathology* 103: 906-919.
- Shah, D., and Madden, L.V. 2013. A comment on Mendes and Yigit. 2013. "Type I error and test power of different tests for testing interaction effects in factorial experiments", *Statistica Neerlandica*, 67:1-26. *Statistica Neerlandica* 67: 397-399.
- Shah J., Desai P.T., Chen D., Stevens J.R., and Weimer B.C. 2013. "Pre-adaptation to cold-stress in Salmonella Typhimurium increases survival during subsequent acid-stress exposure". *Applied and Environmental Microbiology* 79(23): 7281-7289.
- Shah, D.A., De Wolf, E.D., Paul, P.A., and Madden, L.V. 2014. "Predicting Fusarium head blight epidemics with boosted regression trees." *Phytopathology* 104: 702-714.
- Stoner, D.C., M.L. Wolfe, C. Mecham, M.B. Mecham, S.L. Durham, and D.M. Choate. 2013. "Dispersal behavior of a polygynous carnivore: do cougars *Puma concolor* follow source-sink predictions?" *Wildlife Biology* 19: 289-301.
- Stoner, D.C., M.L. Wolfe, W.R. Rieth, K.D. Bunnell, S.L. Durham, and L.L. Stoner. 2013. "De facto refugia, ecological traps and the biogeography of anthropogenic cougar mortality in Utah." *Diversity and Distributions* 19: 1114-1124.
- Tabanca, N., Wang, M., Avonto, C., Chittiboyina, A.G., Parcher, J.F., Carroll, J.F., Kramer, M., and Khan, I.A. 2013. "Bioactivity-guided investigation of geranium essential oils as natural tick repellents". *Journal of Agricultural Food Chemistry* 61: 4101-4107.
- Tomer, M.D., P. C. Beeson, D. W. Meek, D. N. Moriasi, C. G. Rossi, A. M. Sadeghi. 2013. "Evaluating simulations of daily discharge from watersheds using autoregression and an index of flashiness". *Transactions of ASABE* 56(4): 1317-1326.
- Trier, T., N. M. Bello, T. R. Bush and L. Bix. 2014. "Role of packaging on contamination rates during simulated presentation to a sterile field." *PLoS One* 9(7): e100414.
- Tucker R.M, Edlinger C, Craig B.A., and Mattes R.D. 2014 Associations between BMI and fat taste sensitivity in humans. *Chemical Senses* 39(4): 349-357.
- Vega FE, Simpkins A, Bauchan G, Infante F, Kramer M, Land MF. 2014. "On the eyes of male coffee berry borers as rudimentary organs". *PLoS One* 9(1): e85860. doi:10.1371/journal.pone.0085860
- Yeater, K.M., S.E. Duke, and W.E. Riedell. 2014. "Multivariate Analysis: Greater Insights into Complex Systems." *Agronomy Journal*. doi:10.2134/agronj14.0017.

Xu, X., Madden, L.V., Edwards, S.G., Doohan, F.M., Moretti, A., Hornok, L., Nicholson, P., and Ritieni, A. 2013. "Developing logistic models to relate the accumulation of DON associated with Fusarium head blight to climatic conditions in Europe." *European Journal of Plant Pathology* 137: 689-706.

Xu, X., Madden, L.V., and Edwards, S.G. 2014. "Relating HT2 and T2 toxin accumulation in field oat grains to environmental conditions." *Phytopathology* 104: 57-66.

Xie, L., and Madden, L.V. 2014. "%HPGLIMMIX, a high performance SAS macro for GLMM estimation." *Journal of Statistical Software* 58(8): 1-25. <http://www.jstatsoft.org/>