

DIRECTOR'S REPORT OF RESEARCH IN KANSAS 2016

JULY 1, 2015–JUNE 30, 2016

K-STATE
Research and Extension

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Letter of Transmittal

Office of the Director

To the Honorable Sam Brownback, Governor of Kansas

It is my pleasure to transmit herewith the report of the Agricultural Experiment Station of the Kansas State University of Agriculture and Applied Science for the fiscal year ending June 30, 2016. This report contains the title, author, and publication information for manuscripts published by station scientists. The report was published only in electronic format.

John D. Floros, Ph.D.
Director, K-State Research and Extension
Dean, College of Agriculture

A Message from the Director

It is a pleasure to provide the 2016 Director's Report of Research in Kansas. The report documents our current research programs and some of our accomplishments. K-State Research and Extension provides trusted, practical education to help individuals, businesses and communities solve problems, develop skills, and build a better future.

This report is produced and distributed in electronic format. This reduces printing costs and makes the report accessible to a broader audience.

The 2016 Director's Report of Research in Kansas includes a list of journal articles, station publications, and other published manuscripts from scientists in our departments, research-extension centers, and associated programs.

The Kansas Agricultural Experiment Station was established in 1887 to conduct research vital to the success of Kansas. In 1914, the Kansas Cooperative Extension Service was created to disseminate research-based information to the public. During our strategic planning process, we received input from 5,000 stakeholders to determine five grand challenges facing Kansans — global food systems, water, health, developing tomorrow's leaders, and community vitality. Our research programs provide the latest information through our statewide network to address those challenges.

John D. Floros, Ph.D.
Director, K-State Research and Extension
Dean, College of Agriculture



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To find publications by a particular author, type the surname in the “find” search box in the Acrobat toolbar in this document. Use “Find Next” until all relevant publications are found.

To minimize irrelevant items when searching for common names such as Smith, go to the page for the author’s unit (or use the unit bookmark) to start your search.



A Message from the Associate Director of Research

The Hatch Act established the Kansas Agricultural Experiment Station in 1887 as the food, agriculture, and natural resources research component of Kansas State University, the state’s only land-grant university.

Our statewide network of centers and experiment fields allows our faculty to evaluate crop and livestock production systems across a wide range of environmental conditions. Southeast Kansas is approximately 2,000 feet lower in elevation, receives almost 25 inches more precipitation per year, and the temperature averages about six degrees warmer than northwest Kansas. To be successful, producers must have access to crop varieties and management strategies developed for their local climate and soil conditions. Researchers work closely with farmers and ranchers to ensure that projects directly relate to local needs.

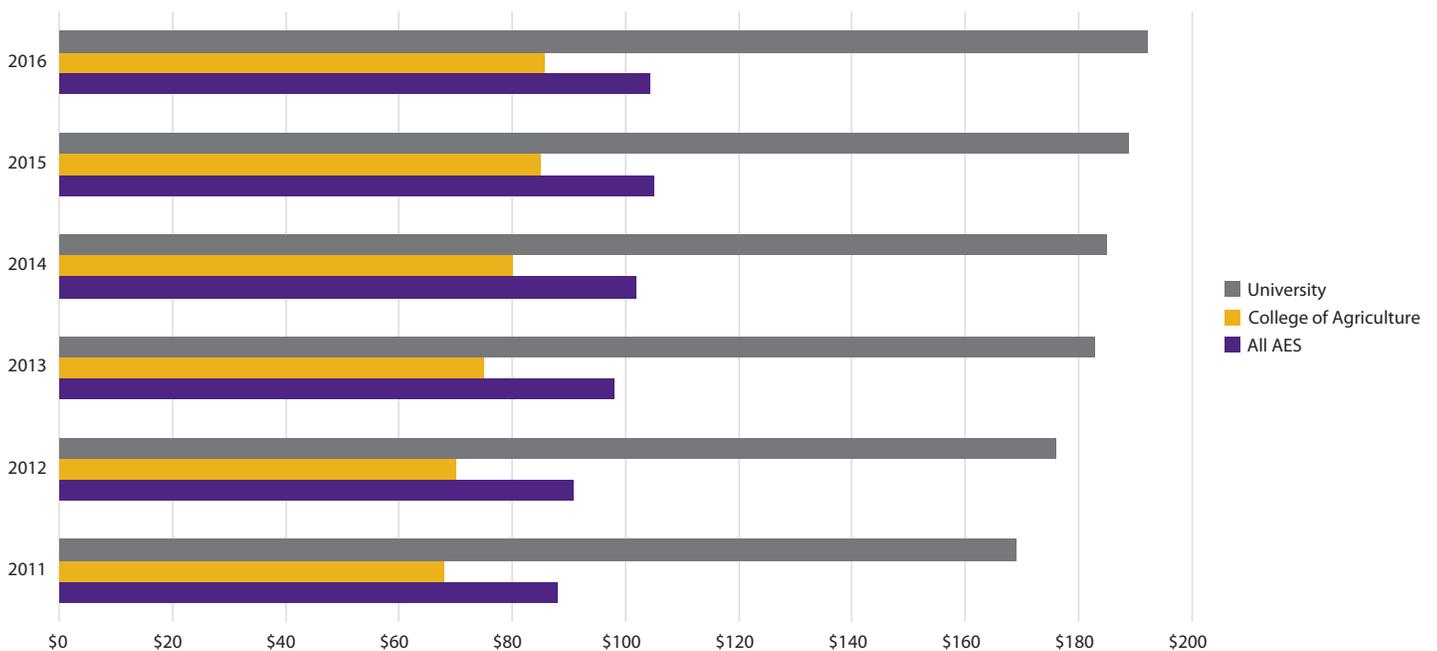
K-State’s Agricultural Experiment Station funds research in 20 academic departments across five colleges on two campuses. In addition to long-term research projects on livestock and crop breeding, scientists are looking at new ways to control pests and diseases, emerging technologies to save water and energy, food safety, postharvest storage, weed control, and more.

As Kansas’ largest employer, agriculture contributes 43 percent of the state’s economy. More than 234,000 people are involved in the production, distribution, and transportation of agricultural products. Our research focuses on the agricultural industry and helping it grow in a sustainable manner.

Kansas Agricultural Experiment Station research expenditures — all funds used to produce research outcomes — represent the majority of Kansas State University’s total research effort. Funds are usually awarded through a highly competitive federal grant system.

J. Ernest Minton
 Associate Director, Research, K-State Research and Extension
 Associate Dean, Research and Graduate Programs, College of Agriculture

Agricultural Experiment Station and University Research Expenditures (in millions)



Making a State Impact

Wheat-breeding expertise assures quality year after year

“With a name befitting its place at the summit of Kansas agriculture, the K-State-produced wheat variety called Everest just completed its fourth year as the top variety planted across the state — and the fifth time out of the last six years that a K-State variety has held the top spot. Everest was first released in 2009, and to have so many years of successful use is almost unheard of,” according to Gary Pierzynski, head of the agronomy department.

“Wheat varieties don’t last that long as their resistance to disease breaks down, and they have to be replaced continually,” Pierzynski said. “We wouldn’t expect Everest to remain the top variety for an extended period, but we’re confident what we’ve released recently will be tops in a couple years’ time.”

In fact, Pierzynski says two new varieties of hard red winter wheat released in 2016, Larry and Zenda, have the potential to replace Everest.

K-State partners with the Kansas Wheat Alliance to continually ensure producers have access to seed that gives them the best yields and quality while keeping resources and research capacity within the state.

The long continuum of successful wheat breeding comes from K-State’s decades of commitment to research and development. Guarong Zhang, wheat breeder at the K-State Agricultural Research Center in Hays, says each successful variety is released to the public only after years of proving its quality.

“Every year we develop and test about 1,000 new breeding lines,” Zhang said. “Before releasing a line, it would have been tested for about 6 to 7 years. A breeding cycle, from start to end, takes 10 to 12 years.”

Larry and Zenda are not the only varieties likely to win favor among producers over the next few years. Zhang expects the new hard red variety, Tatanka, to take the place of Joe, which won the 2016 wheat yield competition in western Kansas and set a record for state yield completion. Zenda is a descendant of Everest.

Tatanka and Larry are derived from Jagger, one of the most successful wheat breeds in the state’s history. Though it is not seen much in Kansas fields anymore, Jagger marked 22 years of productivity in 2016.

The Kansas Wheat Alliance noted that at one point, Jagger was planted on virtually every acre in south-central Kansas and has gone on to be productive in 12 countries. Meanwhile, Jagger continues to have an impact as new varieties are developed from it.

Larry and Joe were named for longtime members of the K-State breeding team Larry Patton and T. Joe Martin. Everest was developed by Martin and Allan Fritz, a K-State alumnus who leads the wheat breeding team.

With a system of experts that spans the state, the breeding team carries forward the legacy of developing the right combinations of yield, drought tolerance, disease resistance and processing qualities.



10 *years average wheat breeding cycle*

622,530

seeds in Wheat Genetics Resource Center

Research Components of the Kansas Agricultural Experiment Station

(see map, next page)

Academic Departments

College of Agriculture

Agricultural Economics
Agronomy
Animal Sciences and Industry
Communications and Agricultural Education
Entomology
Grain Science and Industry
Horticulture and Natural Resources
Plant Pathology

College of Arts and Sciences

Biochemistry and Molecular Biophysics
Biology
Sociology, Anthropology, and Social Work
Statistics

College of Engineering

Biological and Agricultural Engineering
Chemical Engineering

College of Human Ecology

Apparel, Textiles, and Interior Design
Hospitality Management
Food, Nutrition, Dietetics and Health

College of Veterinary Medicine

Anatomy and Physiology
Clinical Sciences
Diagnostic Medicine/Pathobiology

Research Centers

Agricultural Research Center
(Hays, HB Ranch, and Saline Experimental Range)
John C. Pair Horticultural Center (Haysville)
K-State Research and Extension Center
for Horticultural Crops (Olathe)
Northwest Research-Extension Center (Colby)
Southeast Research and Extension Center
(Parsons, Columbus, Mound Valley)
Southwest Research-Extension Center (Garden City)
Southwest Research-Extension Center (Tribune)

Experiment Fields

East Central – Ottawa
Kansas River Valley – Rossville, Topeka
North Central and Irrigation – Belleville, Scandia
Pecan Field – Chetopa
South Central – Hutchinson

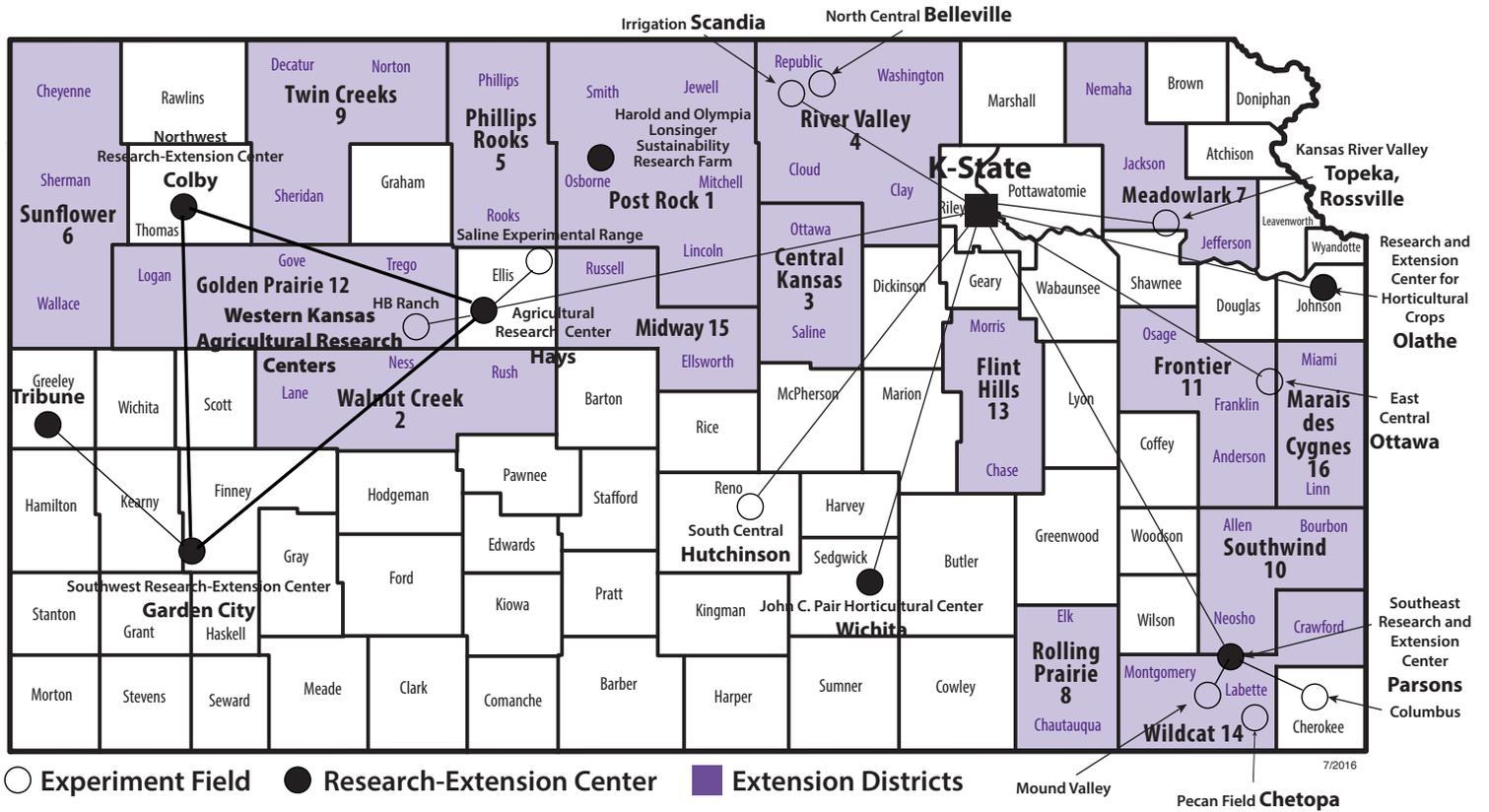
Associated Programs

Bioprocessing and Industrial Value Added Products Innovation
Center
Center for Biobased Products by Design
Center for Sorghum Improvement
Center for Sustainable Energy
Food Science Institute
Fungal Genetics Stock Center
Great Plains Diagnostic Network
IGP Institute
K-State Libraries
Kansas Agriculture and Rural Leadership
Kansas Center for Agricultural Resources
and the Environment
Kansas Center for Sustainable Agriculture
and Alternative Crops
Kansas Water Resources Institute
Konza Prairie Biological Station
Large Animal Research Center
National Science Foundation Industry/
University Cooperative Research for Wheat Genetics
Plant Biotechnology Center
Veterinary Diagnostic Laboratory
Weather Data Library
Wheat Genetics Resource Center

USAID Feed the Future Innovation Labs

Applied Wheat Genomics
Reduction of Post-Harvest Loss
Sorghum and Millet
Sustainable Intensification

Kansas State University Agricultural Research Locations



Station Publications

Reports of Progress

SRP 1119	2015 Kansas Performance Tests with Winter Wheat Varieties
SRP 1120	2015 Kansas Performance Tests with Corn Hybrids
SRP 1121	2015 Kansas Performance Tests with Soybean Varieties
SRP 1122	2015 Kansas Performance Tests with Grain Sorghum Hybrids
SRP 1123	2015 Kansas Performance Tests with Sunflower Hybrids
SRP 1125	2015 National Winter Canola Variety Trial
SRP 1126	2016 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland *Cattlemen's Day 2016 Roundup 2016, Agricultural Research Center–Hays 2016 Agricultural Research, Southeast Agricultural Research Center K-State Turfgrass Research 2016 Kansas Field Research 2016 Kansas Fertilizer Research 2016 Field Day 2016, Southwest Research-Extension Center Swine Day 2016 Dairy Research 2016

Special Publications

DRR15	Director's Report of Research in Kansas 2015
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Understanding Contribution Numbers

Contribution numbers have three parts:

- The first two digits denote the year (state fiscal) of assignment.
- The second set of digits identifies the manuscript (numbered consecutively throughout the year).
- The suffix letter identifies the type of publication.

A	Proceedings of meeting or symposium
B	Book or book chapter
C	Computer program
D	Department report
J	Journal manuscript
S	Station publication (Report of Progress, Keeping up with Research, Special Publication, or Bulletin)
T	Trade publication

Categories are based on information received before manuscripts are published. Type of publication sometimes changes later.

Station publications are available at:

<http://newprairiepress.org/kaesrr/>

<http://www.bookstore.ksre.ksu.edu/>

Department reports are available only from the appropriate department office. Copies of journal articles or other external publications must be obtained from authors, journals, or a library. Some citations include a digital object identifier (doi) for use in retrieving manuscripts online. To locate an object using its doi, simply paste the doi into your browser or visit <http://dx.doi.org/>.

*As of March 2015, Kansas Agricultural Experiment Station reports are posted at <http://newprairiepress.org/kaesrr/>. These reports no longer have "SRP" numbers. They are now listed by volume and issue (2015 Cattlemen's Day Research, Volume 1, Issue 1; <http://newprairiepress.org/kaesrr/vol1/iss1/>). Recommended citations and doi numbers are listed with each report.

Recommended Citation

Vesco, A. C.; Sexten, A. K.; Weibert, C. S.; Oleen, B. E.; Hollenbeck, W. R.; Grimes, L. C.; and Blasi, Dale (2015) "Evaluation of the Productivity of a Single Subcutaneous Injection of LongRange in Stocker Calves Compared With a Positive (Dectomax) and a Negative (Saline) Control," Kansas Agricultural Experiment Station Research Reports: Vol. 1: Iss. 1. <http://dx.doi.org/10.4148/2378-5977.1018>

Agricultural Economics

- 16-016-J Costs of using unmanned aircraft on crop farms
N. Ireland-Otto, I. Ciampitti, M.T. Blanks, R.O. Burton, Jr., T. Balthazor
Journal of the American Society of Farm Managers and Rural Appraisers
2016:130-148
- 16-028-J Quantifying variety-specific heat resistance and the potential for adaptation to climate change
J.B. Tack, J.A. Barkley, T.W. Rife, J.A. Poland, L.L. Nalley
Global Change Biology
22(August 2016)8:2904-2912
- 16-069-J Factors affecting methane emissions from rice production in the Lower Mississippi river valley, USA
K.R. Brye, L.L. Nalley, J.B. Tack, B.L. Dixon, A.P. Barkley, C.W. Rogers, A.D. Smartt, R.J. Norman, K.S.V. Jagadish
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- 16-132-J Red Arrow products smokin' into the future: Facing changing diets and new challenges in the food industry - Teaching Notes
K. Harris
International Food and Agribusiness Management Review
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18(2015)4:223-237
- 16-182-J Implications of non-farm work to vulnerability to food poverty-recent evidence from northern Ghana
Y.A. Zereyesus, W.T. Embaya, F. Tsiboe, and V. Amanor-Boadu
World Development
March 2017
Volume 91, p. 113-124
<http://dx.doi.org/10.1016/j.worlddev.2016.10.015>
- 16-211-D Staff, programs, and publications in agricultural economics, Kansas State University, 2015
D. Foster
Department Staff Paper 16-01
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SP16-01(2015):1-65
- 16-225-A Longevity: An important aspect in SDI success
F.R. Lamm, D.H. Rogers, I. Kisekka, J. Aguilar
Proceedings of 28th Central Plains Irrigation Conference, Kearney, NE
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February 23-24, 2016. p. 19-28
- 16-226-A Using the K-State center pivot sprinkler and SDI economic comparison spreadsheet - 2016
F.R. Lamm, D.M. O'Brien, D.H. Rogers
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<https://www.ksre.k-state.edu/irrigate/oow/p16/LammUsingCPSDI16.pdf>
- 16-240-D 2015 Fence material and construction cost survey in Kansas
L. Tsoodle and X. Li
Department Staff Paper 16-02
February 2016
SP16-02(Feb 2016):1-4
- 16-245-J Evaluation of climatic variables as yield-limiting factors for maize yield in Kansas
Q. Ye, X. Lin, E. Adey, D. Min, Y. Assefa, D. O'Brien, I.A. Ciampitti
International Journal of Climatology
March 2017
doi: 10.1002/joc.5015
- 16-295-J A case for business continuity: Product movement during a highly pathogenic avian influenza outbreak
J.M. Thomson and D.L. Pendell
Choices Magazine
2016
Quarter 2
www.choicesmagazine.org/choices-magazine/theme-articles/economic-consequences-of-highly-pathogenic-avian-influenza/proactive-risk-assessments-to-improve-business-continuity

Agricultural Research Center - Hays

- 15-084-J Long-term residual effects of feedlot manure application on crop yield and soil surface chemistry
A. Obour, P.W. Stahlman, C.A. Thompson
Journal of Plant Nutrition
January 2017
Vol. 40, Issue 3
<https://doi.org/10.1080/01904167.2016.1245323>
- 15-126-J Natural variation and genome-wide association study of antioxidants in a diverse sorghum collection
D. Rhodes, P. Gadgil, R. Perumal, T. Tesso, T.J. Herald
Cereal Chemistry
April 2017
Vol. 94, Issue 2, p. 190-198
<https://doi.org/10.1094/CCHEM-03-16-0075-R>
- 16-014-J Comparative life histories of greenbugs and sugarcane aphids (Hemiptera: Aphididae) co-infesting susceptible and resistant sorghums
M.H. Bayoumy, R. Perumal, J.P. Michaud
Journal of Economic Entomology
February 2016
Vol. 109, Issue 1, p. 385-391
<https://doi.org/10.1093/jee/109/1/385>
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J. Lingenfelter and multiple co-authors
SRP1119
Kansas Agricultural Experiment Station
- 16-022-S 2015 Kansas performance tests with corn hybrids
J. Lingenfelter and multiple co-authors
SRP1120
Kansas Agricultural Experiment Station
- 16-024-S 2015 Kansas performance tests with grain sorghum hybrids
J. Lingenfelter and multiple co-authors
SRP1122
Kansas Agricultural Experiment Station
- 16-025-S 2015 Kansas performance tests with sunflower hybrids
J. Lingenfelter and multiple co-authors
SRP1123
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- 16-054-J Impact of high temperature stress on floret fertility and individual grain weight of grain sorghum: sensitive stages and thresholds for temperature and duration
P.V. Vara Prasad, M. Djanaguiraman, R. Perumal, I.A. Ciampitti
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doi: 10.3389/fpls.2015.00820
- 16-059-J Effect of fence-line or drylot weaning on the health and performance of beef calves during weaning, receiving, and finishing
E.A. Bailey, J.R. Jaeger, J.W. Waggoner, G.W. Preedy, L.A. Pacheco, KC Olson
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<http://dx.doi.org/10.15232/pas.2015-01456>
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Z. Liu, I. El-Basyoni, G. Kariyawasam, G. Zhang, A. Fritz, J. Hansen, F. Marais, A. Friskop, S. Chao, E. Akhunov, P.S. Baenzler
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- 16-129-J Controlling honey locust (*Gleditsia triacanthos*) with cut stump- and basal bark-applied herbicides for grazed pasture
K. Harmony and multiple co-authors
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September 2016
Vol. 30, Issue 3, 30:801-806
<https://doi.org/10.1614/WT-D-15-00154.1>
- 16-142-J Broadleaf weed control in sunflower (*Helianthus annuus*) with preemergence-applied pyoxasulfone with and without sulfentrazone.
P.W. Stahlman, S.S. Reddy, P.W. Geier
Agricultural Sciences
November 2015
Vol. 6, Issue 11
10.4236/as.2015611125
- 16-166-J 2,4-D past, present, and future: A review of one of the world's most widely used herbicides
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Weed Technology
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- 16-244-J Species composition changes in Conservation Reserve Program (CRP) grassland when managed for biomass feedstock production
K.R. Harmony, D.K. Lee, R.L. Kallenbach, E.Z. Aberle
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December 2016
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<https://doi.org/10.1007/s12155-016-9764-9>
- 16-287-J Kochia (*Kochia scoparia*) emergence profiles and seed persistence across the Central Great Plains
J.A. Dille, W. Stahlman, J. Du, P.W. Geier, J.D. Riffel, R.S. Currie, R.G. Wilson, G.M. Sbatella, P. Westra, A.R. Kniss, M.J. Moechnig, R.M. Cole
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- 16-322-J Camelina seed yield and fatty acid composition as influenced by genotype and environment in the U.S. Great Plains
A.K. Obour, E. Obeng, Y. Mohammed, I.A. Ciampitti, T.P. Durrett, J.A. Moreno, C. Chen
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- ## Agronomy
- 14-028-J Intraspecific variation of a dominant grass and local adaptation in reciprocal garden communities along a US Great Plains' precipitation gradient: Implications for grassland restoration with climate change
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- 14-053-A Assessment of long-term monthly and seasonal trends of warm (cold), wet (dry) spells in Kansas, USA
H. Dokoohaki and A. Amandhi
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- 14-084-J Foreword
N. Bolan, S. Saggar, M.B. Kirkham,
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Science of The Total Environment
November 2018
Vol. 465
<https://doi.org/10.1016/j.scitotenv.2013.03.062>
- 14-153-J Health and environmental impacts of smoke
from vegetation fires: A review
Z.F. Liu, D.J. Murphy, R. Maghirang, D. Devlin
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- 14-225-J Effects of seed protection chemicals on stand
and yield of grain sorghum at Ottawa, Kansas,
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D.J. Jardine and E. Adee
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- 14-236-J Effects of seed protection chemicals on stand
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A. Anandhi, S. Hutchinson, J. Harrington,
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causing loss of preharvest sprouting (PHS)
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S. Liu, S.K. Sehgal, M. Lin, J. Li, H.N. Trick,
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- 15-036-J Predicting soybean relative maturity and seed
yield using canopy reflectance
B.S. Christenson, W.T. Schapaugh Jr., N. An,
K.P. Price, V. Prasad, A.K. Fritz
Crop Science
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Vol. 56, No. 2, p. 625-643
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- 15-038-J Modeling the impact of global warming on the
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Brazil
M.C. Grossi, F. Justino, C.L.T. Andrade,
E.A. Santos, R.A. Rodrigues, L.C. Costa
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Vol. 19, Part B, p. 171-182, ISSN 1875-9637
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- 15-084-J Long-term residual effects of feedlot manure application on crop yield and soil surface chemistry
A. Obour, P.W. Stahlman, C.A. Thompson
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January 2017
Vol. 40, Issue 3
<https://doi.org/10.1080/01904167.2016.1245323>
- 15-119-J Lead speciation and in vitro bioaccessibility of compost-amended urban garden soils
C.P. Attanayake, G.M. Hettiarachchi, Q. Ma, G.M. Pierzynski, M.D. Ransom
Journal of Environmental Quality
September 2017
Vol. 46, No. 6, p. 1215-1224
doi: 10.2134/jeq2017.02.0065
- 15-126-J Natural variation and genome-wide association study of antioxidants in a diverse sorghum collection
D. Rhodes, P. Gadgil, R. Perumal, T. Tesso, T.J. Herald
Cereal Chemistry
April 2017
Vol. 94, Issue 2, p. 190-198
<https://doi.org/10.1094/CCHEM-03-16-0075-R>
- 15-143-J Synchrotron-based X-Ray spectroscopy studies for redox-based remediation of lead, zinc, and cadmium in mine waste materials
R.R. Karna, G.M. Hettiarachchi, M. Newville, C.J. Sun, Q. Ma
Journal of Environmental Quality
October 2016
Vol. 45, No. 6
10.2134/jeq2015.12.0616
- 15-188-J Genetic diversity and population structure among sorghum (*Sorghum bicolor*, L.) germplasm collections from Western Ethiopia
D.K. Weerasooriya, F.R. Maulana, A.Y. Bandara, A. Tirfessa, A. Ayana, G. Mengistu, K. Noah, T.T. Tesso
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