Director's Report of Research in Kansas 2017

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Director’s Report of Research in Kansas 2017

July 1, 2016–June 30, 2017

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, 2017. 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 2017 Director’s Report of Research in Kansas. The report documents our 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 2017 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.
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 nation’s first operational 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.

This research helps Kansas farmers contribute to feeding a growing world population. By 2050, there will be an estimated 9.6 billion people globally. Every year, we develop and test nearly 1,000 new wheat breeding lines, tirelessly working to find only the best ones that will grow well in Kansas. In 2016, one of our varieties — Everest — was the top variety planted in Kansas for the fourth straight year.

Great wheat varieties mean great harvests for Kansas farmers, which in turn benefits the local, regional and state economies.

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 an example of the value of this work, it is estimated that Kansas' farms would lose $2.4 billion in crop yield value if weeds are not controlled.

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
Making a State Impact

**Time to Burn: Study examines best season for prescribed burns**

As researchers continue exploring the benefits of summer prescribed burning, Kansas land managers may be on the brink of a real opportunity to explore this alternative on their own property.

KC Olson, K-State professor of range beef cattle nutrition and management, has been researching the benefits of moving prescribed burning from spring to late summer.

Olson’s research began in 2014. The data from that four-year study shows late-summer burning dramatically reduces the incidence of sericea lespedeza, a noxious weed found in at least one-third of the Flint Hills. The plant is known to out-compete native plants for water and nutrients, and it contains high levels of condensed tannins that make it undesirable for cattle grazing.

“We’ve started data collection for a six-year trial, which will involve livestock performance as a primary metric,” he said. “We’re going to test the influences of a traditional spring burn, a summertime burn in the August-September interval, and a fall burn in the September-October interval, to see how those options influence subsequent livestock performance.”

Olson hopes to make a significant contribution to the growing pile of data, confirming the benefits of summer burning.

Poor weather conditions this past April prompted some landowners to postpone pasture burning. Many worried that the moisture was inadequate to fuel the lush regrowth, which is the impetus for burning. Olson hopes pasture managers try summer burning.

**Spring versus summer**

Like a spring burn, you’re still applying fire to plant material. “I recommend people hang their old fire management paradigms on a hook and look at it with fresh eyes, because this is a different animal,” Olson said.

Expect it to move at about one quarter of the surface wind speed. For example, if the surface wind speed is 10 miles an hour, expect that fire to move at about 2½ miles an hour. You can walk and keep up with these things.”

In summer, green and growing foliage contains more water. For the people working the fire, as well as neighbors, the experience is less irritating.

“As the fire makes contact, that water flash boils,” Olson said. “The smoke cloud looks dense, more intimidating, but that’s because of all the steam.”

To reduce walking in extreme heat, Olson modified his prescribed fire team. “We’re using more small vehicles – think all-terrain vehicles – to work that fire line. If possible, no one walks more than a few feet to spare our people unnecessary exertion in extremely hot temperatures.”

Olson added that his summer burn teams generally employ fewer people than his spring burn teams.

“The aftermath of a spring fire usually looks like a pool table – slick, black, and little residual material,” Olson observed. “In the summer, fire intensity is much lower. Chances are most of the above ground vegetation is not going to go away completely. You will see standing green material immediately after the fire passes, and it looks like the fire didn’t have any effect at all. But maybe 48 hours after the fire, what was standing green material the day of the fire is now brown, dead, and top-killed. You’ve just caused the whole plant community to reboot itself.”

While those are the major differences between spring and summer burns, all the rules and ordinances apply. You still have to contact your county government for a burn permit. You still have to advise local emergency management teams of your fire, both before you light it and after it’s out.
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
- Division of Biology
- Sociology, Anthropology, and Social Work
- Statistics

**College of Engineering**
- Biological and Agricultural Engineering

**College of Human Ecology**
- Apparel, Textiles, and Interior Design
- Hospitality Management
- Family Studies and Human Services
- 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)

**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 Center (Tribune)**

**Southwest Research-Extension Center (Garden City)**

**Experiment Fields**

**East Central (Ottawa)**

**John C. Pair Horticultural Center (Haysville)**

**Kansas River Valley (Rossville, Topeka)**

**North Central and Irrigation (Belleville, Scandia)**

**Pecan Field (Chetopa)**

**South Central (Hutchinson)**

**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

**Associated Programs**
- AgManager.info
- Beef Cattle Research Center
- Beef Stocker Unit
- Bio Materials and Technology Lab
- Bioprocessing and Industrial Value-Added Products
- Biosecurity Research Institute
- Cargill Feed Safety Research Center
- Center for Bio-based Products by Design
- Center for Risk Management Education and Research
- Center for Rural Enterprise Engagement
- Center for Sorghum Improvement
- Center for Sustainable Energy
- Environmental Health and Safety Office
- Food Science Institute
- Fungal Genetics Stock Center
- Grain-Feed Microbiology and Toxicology Laboratory
- Great Plains Diagnostic Network
- International Grains Program Institute
- Insect Zoo
- Hal Ross Flour Mill
- Horse Unit
- K-State Global Food Systems
- K-State Libraries
- K-State Meat Lab (cookery, sensory, color, chemistry, microbiology, customized)
- K-State Pet Food Program
- K-State Radio Network
- K-State Rapid Response Center
- Kansas Agriculture and Rural Leadership
- Kansas Center for Agricultural Resources and the Environment
- Kansas Center for Sustainable Agriculture and Alternative Crops
- Kansas Cooperative Extension Service
- Kansas FFA
- Kansas Wheat Innovation Center
- Kansas Youth Institute
- Kansas Value-Added Foods Lab
- Kansas Water Resources Institute
- Konza Prairie Biological Station
- KSRE News and Media Services
- National Science Foundation Industry/University Cooperative Research for Wheat Genetics
- O. H. Kruse Feed Technology Innovation Center
- Plant Biotechnology Center
- Sheep and Meat Goat Center
- Soil Carbon Center
- Tom Avery Poultry and Game Bird Research Unit
- University Gardens
- Veterinary Diagnostic Laboratory
- Weather Data Library
- Wheat Genetics Resource Center
- Wheat Quality Lab
Station Publications

Reports of Progress

SRP 1128  2016 Kansas Performance Tests with Winter Wheat Varieties
SRP 1129  2016 Kansas Performance Tests with Corn Hybrids
SRP 1130  2016 Kansas Performance Tests with Soybean Varieties
SRP 1131  2016 Kansas Performance Tests with Grain Sorghum Hybrids
SRP 1133  2016 Kansas Performance Tests with Sunflower Hybrids
SRP 1132  2017 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland *Cattlemen's Day 2017
2017 Agricultural Research, Southeast Agricultural Research Center
K-State Turfgrass Research 2017
Kansas Field Research 2017
Kansas Fertilizer Research 2017
Field Day 2017, Southwest Research-Extension Center
Swine Day 2017
Dairy Research 2017

Special Publications

DRR16    Director’s Report of Research in Kansas 2016

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
**Agricultural Economics**

15-454-J  Quantifying the agronomic and economic performance of hybrid and conventional rice varieties
L. Nalley, J. Tack, A. Barkley, K. Jagadish, K. Brye
Agronomy Journal
February 2016
Vol. 108
10.2134/agronj2015.0526

16-063-J  Using network flow modeling to determine pig flow in a commercial production system
Journal of Computers and Electronics in Agriculture
December 2018
Vol. 155
doi.org/10.1016/j.compag.2018.10.022

16-131-J  Johnsonville Sausage LLC: finding new opportunities beyond the pork commodity markets
K. Harris
The CASE Journal
March 2019
Vol. 15, No. 3
doi.org/10.1108/TCJ-11-2017-0106

16-146-J  Cooperating to compete: turning toward a community of practice
K.D. Harris, H.S. James Jr., A. Harris
Journal of Business Strategy
2017
Vol. 38, Issue 4
doi.org/10.1108/JBS-03-2016-0035

16-173-J  Women's empowerment in agriculture and household-level health in northern Ghana: A capability approach
Y.A. Zereyesus
Journal of International Development
August 2017
Vol. 29, Issue 7
doi.org/10.1002/jid.3307

16-338-J  Trends in the use of new-media marketing in U.S. ornamental horticulture industries
H.H. Peterson, C.R. Boyer, L.M. Baker, B.H. Yao
Horticulturae
2018
Vol. 4, Issue 4
doi.org/10.3390/horticulturae4040032

17-037-J  Spatio-temporal evaluation of plant height in corn via unmanned aerial systems
S. Varela, Y. Assefa, P.V.V. Prasad, N.R. Peralta, T.W. Griffin, A. Sharda, A. Ferguson, I.A. Ciampitti
Journal of Applied Remote Sensing
August 2017
Vol. 11, Issue 3
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17-114-J  The production of food and fiber: An adaptation of CoP features for sustainable water use in agribusiness
K.D. Harris, H.S. James
Journal of Sustainability
2016
Vol. 8
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17-120-J  Factors affecting risk-rating migration
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Agricultural Finance Review
2017
Vol. 77, Issue 1
doi.org/10.1108/AFR-05-2016-0044

17-198-J  Relationship marketing: A qualitative case study of new-media marketing use by Kansas garden centers
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Horticulturae
2017
Vol. 3, Issue 1
doi.org/10.3390/horticulturae3010026
17-199-J Marketing with more: An in-depth look at relationship marketing with new media in the green industry
S. Stebner, C.R. Boyer, L.M. Baker, H.H. Peterson
Journal of Agricultural Communications
2017
Vol. 101, Issue 2
doi.org/10.4148/1051-0834.1001

17-250-J Online opportunities: A qualitative content analysis benchmark study of online retail plant sales
HortTechnology
2018
Vol. 28, Issue 4
doi.org/10.21273/HORTTECH03901-17

17-346-J Evaluation of Teaching in Departments of Agricultural Economics
B.K. Coffey, A. Barkley
NACTA
March 2018
Vol. 62, Issue 1

Agricultural Research Center - Hays

16-267-J Reduced absorption of glyphosate and decreased translocation of dicamba contribute to poor control of Kochia (Kochia scoparia) at high temperature
J. Ou, P.W. Stahlman, M. Jugulam
Journal of Pest Management Science
May 2018
Vol. 74, Issue 5, 1134-1142
doi.org/10.1002/ps.4463

C.R. Little, R. Perumal
Agron. Monogr. 58. ASA and CSSA, Madison, WI
2018
ISBN: 978-0-89118-628-1
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17-009-J Nitrogen fertilizer application effects on switchgrass herbage mass, nutritive value and nutrient removal
A.K. Obour, K. Harmoney, J.D. Holman
Crop Science
June 2017
Vol. 57, No. 3
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17-022-S 2016 Southwest Research-Extension Center field day report
B. Gillen and multiple co-authors
Kansas Agricultural Experiment Station
Vol. 2, Issue 7
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17-026-J An isolate of wheat streak mosaic virus from foxtail overcomes Wsm2 resistance in wheat
T.T. Kumssa, J.S. Rupp, M.C. Fellers, J.P. Fellers, G. Zhang
Plant Pathology
May 2019
Vol. 68, Issue 4
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17-065-J Phenotypic plasticity of winter wheat heading date and grain yield across the US Great Plains
Crop Science
May 2016
Vol. 56, No. 5
doi/10.2135/cropsci2015.06.0357
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<td>17-080-J</td>
<td>Resilience of pollen and post-flowering response in diverse sorghum genotypes exposed to heat stress under field conditions</td>
<td>V.S.J. Sunoj, I.M. Somayanda, A. Chiluwal, R. Perumal, P.V.V. Prasad, S.V.K. Jagadish</td>
<td>Crop Physiology &amp; Metabolism</td>
<td>2017</td>
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<td>doi.org/10.2135/cropsci2016.08.0706</td>
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*Environmental Entomology*
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Sensitivity of sorghum pollen and pistil to high-temperature stress
M. Djanaguiraman, R. Perumal, S.V.K. Jagadish, I.A. Ciampitti, R. Welti, P.V.V. Prasad
*Plant, Cell and Environment*
May 2018
Vol. 41, Issue 5
doi.org/10.1111/pce.13089

Increased power to dissect adaptive traits in global sorghum diversity using a nested association mapping population
*Genetics*
2017
Vol. 206, Issue 2
doi.org/10.1534/genetics.116.198499

Book chapter: Sorghum breeding for biotic stress tolerance
*Achieving Sustainable Cultivation in Sorghum: Genetics, Breeding, and Production Techniques* (Rooney, W.L., ed.)
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Registration of ‘Tatanka’ hard red winter wheat
*Journal of Plant Registrations: Cultivar*
January 2017
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No nutritional benefits of egg cannibalism for *Coleomegilla maculata* (Coleoptera: Coccinellidae) on a high-quality diet
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*Bulletin of Entomological Research*
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Vol.108, Issue 3
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Can cover or forage crops replace fallow in the semiarid central Great Plains?
*Crop Science*
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*Journal of Animal Science*
November 2017
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Limb ablation and regeneration in *Harmonia axyridis*: Costs for regenerators, but benefits for their progeny
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*Entomologia Experimentalis et Applicata*
February 2018
Vol. 166, Issue 2
doi.org/10.1111/eea.12649
15-347-J Evaluation of brown midrib sorghum mutants for 2,3-butanediol production
Y.N. Guragain, R.P. Srinivasa, P.V.V. Prasad, P.V. Vadlani
Appl Biochem Biotechnol.
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15-428-J Wheat leaf lipids during heat stress: I. High day and night temperatures result in major lipid alterations
S. Narayanan, P. Tamura, M.R. Roth, P.V.V. Prasad, R. Welti
Plant Physiology
October 5, 2015
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L. Nalley, J. Tack, A. Barkley, K. Jagadish, K. Brye
Agronomy Journal
February 2016
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16-161-J Evaluating optimum limited irrigation management strategies for corn production in the Ogallala Aquifer Region
A. Araya, I. Kisekka, P. V. Vara Prasad, P. H. Gowda
Journal of Irrigation and Drainage Engineering
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IR.1943-4774.0001228

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J. Ou, P. W. Stahlman, M. Jugulam
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16-282-J Yield responses to planting density for U.S. modern corn hybrids: A synthesis-analysis
Y. Assefa, P.V.V. Prasad, P. Carter, M. Hinds, G. Bhalla, R. Schon, M. Jeschke, S. Paszkiewicz, I.A. Ciampitti
Journal of Crop Science
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16-283-J Nutrient partitioning and stoichiometry in unburnt sugarcane ratoon at varying yield levels
Frontiers in Plant Science
April 2016
doi.org/10.3389/fpls.2016.00466

16-284-J Measurements of methane emissions from a beef cattle feedlot using the eddy covariance technique
P. Prajapati, E.A. Santos
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January 2017
Vol. 232
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16-309-J Assessing wheat yield, biomass, and water productivity responses to growth stage based irrigation water allocation
A. Araya, I. Kisekka, P.V.V. Prasad, J. Holman, A.J. Foster, R. Lollato
Transactions of the ASABE
2017
Vol. 60, Issue 1, 107-121
doi:10.13031/trans.11883

16-328-J Stalk rot diseases impact sweet sorghum biofuel traits
Y.M.A.Y. Bandara, D.K. Weerasooriya, T.T. Tesso, C.R. Little
BioEnergy Research
March 2017
Vol. 10, Issue 1
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16-344-J Winter wheat yield gaps and patterns in China
S. Sun, X. Yang, X. Lin, G.F. Sassenrath, K. Li
Agronomy Journal
January 2018
Vol. 110, Issue 1
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16-345-J Physiological and molecular characterization of hydroxyphenylpyruvate dioxygenase (HPPD)-inhibitor resistance in Palmer amaranth (*Amaranthus palmeri* S. Wats.)
Frontiers in Plant Science
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Vol. 11, Issue 8
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16-354-J Morphology, provenance, and decomposition of a 19th century hybrid dugout and sod house in Nicodemus, Kansas
D.R. Presley, E.T. Bugarin
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September 2016
Vol. 119
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ISBN: 978-0-89118-628-1
doi:10.2134/agronmonogr58.2015.0073

R. Perumal, P. Rajendrakumar, F. Maulana, T. Tessio, C.R. Little
Agron. Monogr. 58. ASA and CSSA, Madison, WI
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ISBN: 978-0-89118-628-1
DOI: 10.2134/agronmonogr58.2014.0053

16-367-J Mid-season high-resolution satellite imagery for forecasting site-specific corn yield
N.R. Peralta, Y. Assefa, J. Du, C.J. Barden, I.A. Ciampitti
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