



DIRECTOR'S REPORT OF RESEARCH IN KANSAS 2020

JULY 1, 2019–JUNE 30, 2020

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 Laura Kelly, 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, 2020. This report contains the title, author, and publication information for manuscripts published by station scientists. The report was published only in electronic format.

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

A Message from the Dean and Director

It is a pleasure to provide the 2020 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 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. We continually collect input from stakeholders to fine tune our strategic plan, building on our focus on the 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.

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



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A Message from the Associate Dean and Director for 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 nation's first operational land-grant university.

Our statewide network of centers and experiment fields enables 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. We will never meet that challenge without the tackling the water crisis facing Kansas and more specifically Kansas agriculture. The High Plains Aquifer, which includes the Ogallala Aquifer supplies 70-80% of the daily water use by Kansans. The Ogallala is a declining resource, therefore, our stewardship is critical to meeting our needs for food production and communities while managing that lifeblood of Kansas agriculture. A recent K-State research project found that people overwhelmingly want to conserve the groundwater resource in the region. We will get there through improving efficiency of our water use through innovative technology and sound irrigation practices (ksre-learn.com/OgallalaReport).



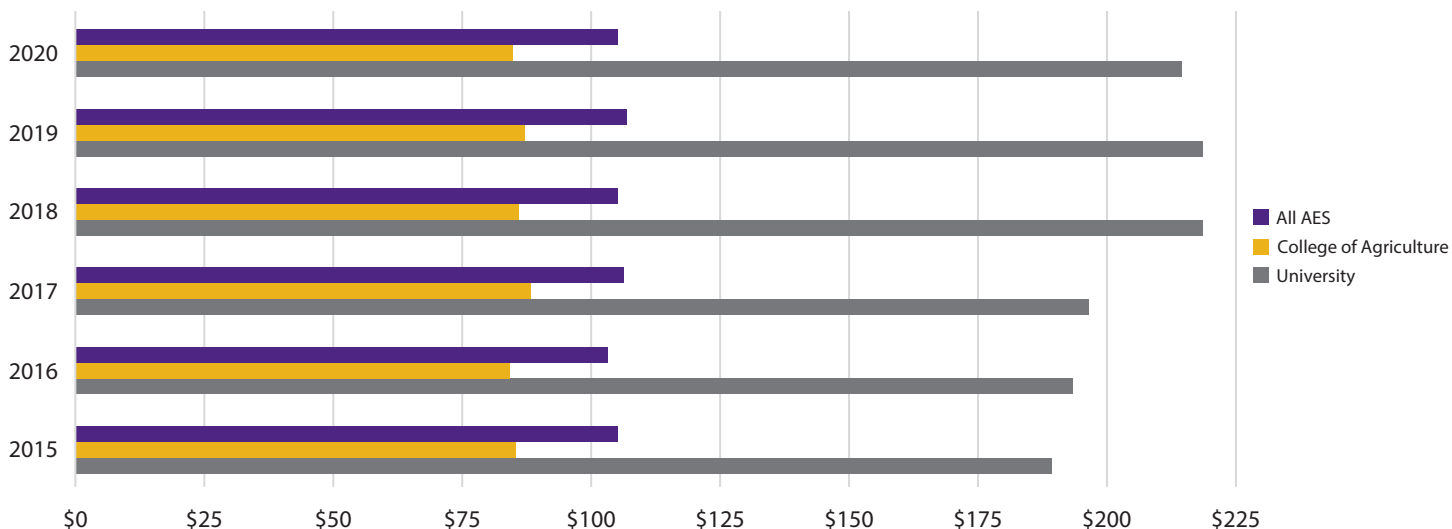
How we address these challenges of water use is dependent on the K-State Agricultural Experiment Station funded research in 20 academic departments across five colleges on two campuses. In addition to long-term research projects on livestock and crops, scientists are looking at new and alternative crops, improved control of pests, weeds and diseases, food safety, post-harvest storage, and more. All of these potential solutions grow from our research capacity and our researchers' capabilities.

As Kansas' largest employer, agriculture contributes 43 percent of the state's economy. According to current data from the national study, Feeding the Economy, 258,670 people are directly employed in Kansas agriculture, accounting for more than \$9.26 billion in wages and \$11.2 billion in business taxes. 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.

Martin Draper,
Associate Dean, Research and Graduate Studies
College of Agriculture, Director for Research

Agricultural Experiment Station and University Research Expenditures (in millions)



Making a State Impact: An Eye on the Tap

For farmers and ranchers in Kansas, drought concerns are always looming, so community conversations about conservation and water use are ongoing and vital. Concerns are ever present about ponds dwindling to muddy puddles, and recently irrigators learned that the Ogallala Aquifer – a main water source for the state – declined last year by an astounding two feet in parts of Kansas.

The urgent work on water conservation forms part of the foundation for the Kansas Center for Agricultural Resources and the Environment (KCARE). Established by Kansas State University, KCARE works to coordinate water and natural resource research, including multiple projects addressing aquifer declines.

But that's only the tip of the iceberg: think "quality," in addition to "quantity."

Consider oil, trash, pet waste or chemicals seeping into storm drains after a downpour, or pesticides and fertilizer leaching off a farmer's fields. Maybe sediment washes away from construction sites or erodes from streambanks.

All are examples of "non-point source pollution," and over time it negatively impacts the water from your faucet, the pond on your farm, or the rivers and reservoirs you visit. In fact, many states have named non-point source pollution as the leading cause of water-quality problems.

For more than 20 years, KCARE has been helping reverse those harmful effects by empowering a team of watershed specialists who actively partner with producers, municipalities and other

important water users to identify and implement science-based solutions to improve water quality.

"We must conserve Kansas water while also safeguarding the quality of the waters we enjoy here," said Associate Director for the College of Agriculture and K-State Research and Extension Susan Metzger. She said KCARE watershed specialists actively partner with water users to implement on-the-ground practices that assist both producers and municipalities to limit the amount of sediment and nutrients entering Kansas waters.

This grassroots approach works. Metzger said the program has prevented tens of thousands of tons of sediment from entering rivers and reservoirs.

"The desire of clean water is a constant in our communities," said KCARE watershed specialist Ron Graber. "Our job is to listen to producers and other stakeholders, and help folks work toward common goals. I think we're all making a difference."

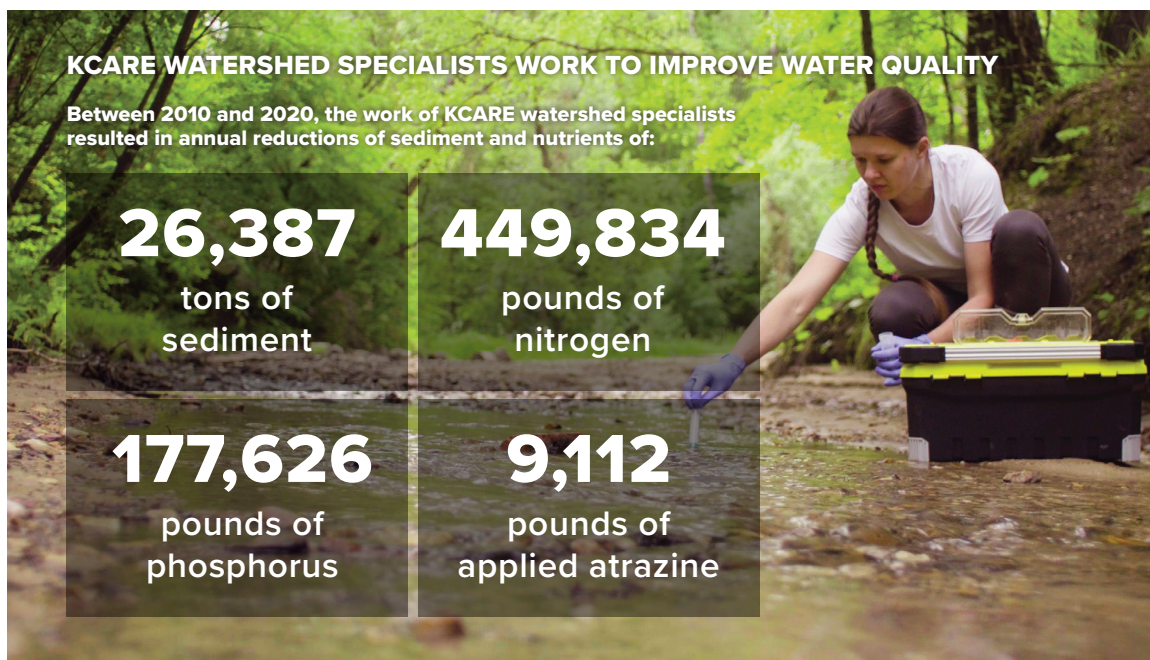
Graber said that the work has evolved over the years, from identifying water quality concerns, to implementing solutions, or best management practices that match a community's needs. Best management practices can range from planning alternative livestock watering facilities, to reducing atrazine use on cropland, to stabilizing streambanks. Watershed specialists provide technical assistance to producers to explain which solutions are right for their specific situation and assist farmers to identify financial programs to offset costs.

"This important work goes beyond providing the public with facts and figures. It remains successful because each team

member combines scientific expertise with a focus on relationships and people," Metzger said.

"If you get to know someone and then explain how we can create a solution together, it's more effective than just telling them to fix a problem," said Graber. "When we work together, then it's a win for Kansas water."

– Melissa Harvey
and [KCARE](#)



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
Family Studies and Human Services
Food, Nutrition, Dietetics and Health

College of Veterinary Medicine

Anatomy and Physiology
Clinical Sciences
Diagnostic Medicine/Pathobiology

Research Centers

Western Kansas Research and Extension Centers

Agricultural Research Center – Hays
– HB Ranch
– Saline Experimental Range
– Harold and Olivia Lonsinger Sustainability Farm
Northwest Research-Extension Center (Colby)
Southwest Research Center (Tribune)
Southwest Research-Extension Center (Garden City)

Eastern Kansas Research and Extension Centers

John C. Pair Horticultural Research and Extension Center
(Haysville)
Northeast Research and Extension Center
Olathe Horticulture Research and Extension Center
Southeast Research and Extension Center (Parsons, Columbus,
Mound Valley)

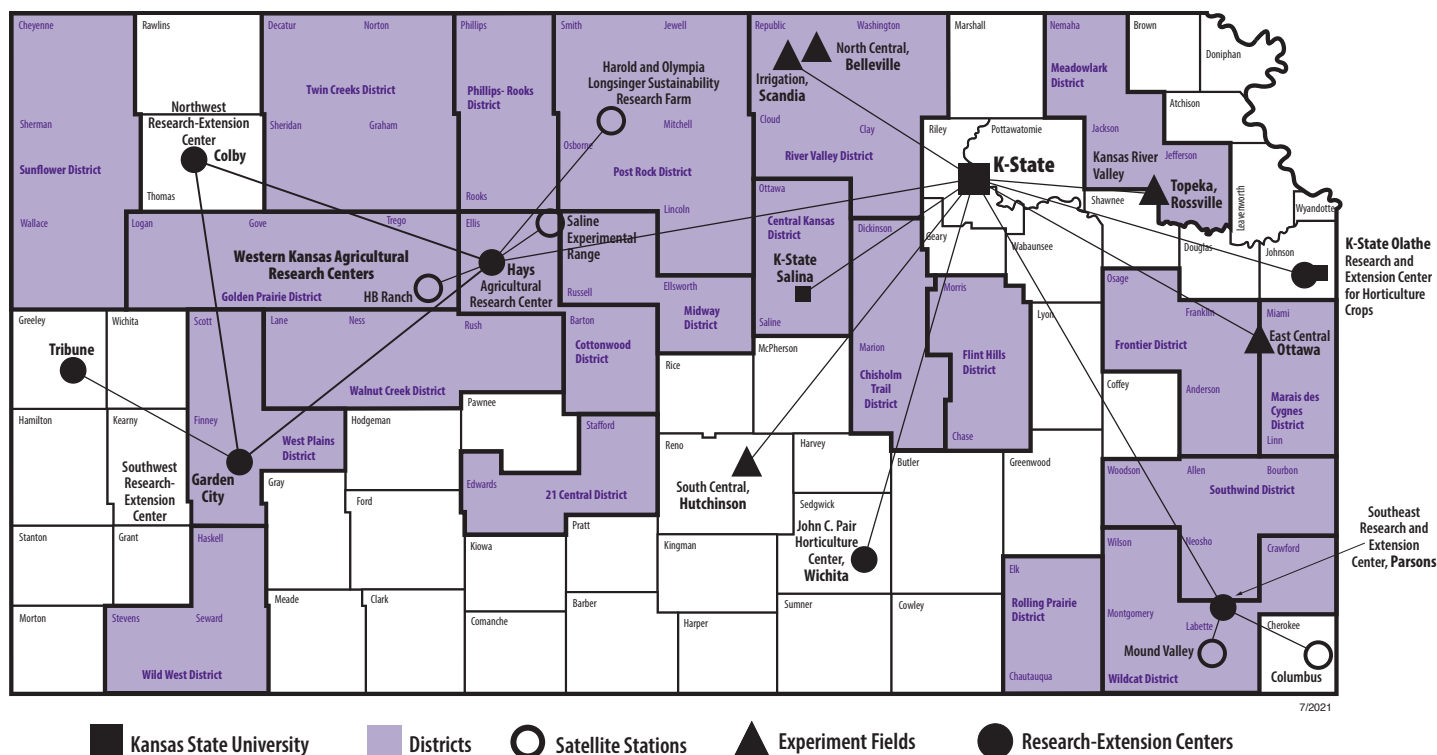
Experiment Fields

East Central (Ottawa)
Kansas River Valley (Rossville, Topeka)
North Central and Irrigation (Belleville, Scandia)
South Central (Hutchinson)
North Agronomy Farm (Manhattan)
Ashland Bottoms Research Farm (Manhattan)
Rocky Ford Plant Pathology Farm (Manhattan)
Rocky Ford Horticultural Farm (Manhattan)

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
 Cow-Calf Unit
 Dairy Teaching and Research Center
 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
 Kansas Artificial Breeding Service Unit
 K-State Global Food Systems
 K-State Libraries
 K-State Meat Laboratory
 K-State Pet Food Program
 K-State Radio Network

K-State Rapid Response Center
 K-State Research and Extension Communications Solutions
 K-State Research and Extension Soils Laboratory
 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 Foundation Seed
 Kansas Wheat Innovation Center
 Kansas Youth Institute
 Kansas Value-Added Foods Lab
 Kansas Water Resources Institute
 Konza Prairie Biological Station
 National Science Foundation Industry/University Cooperative
 Research for Wheat Genetics
 O.H. Kruse Feed Technology Innovation Center
 Plant Biotechnology Center
 Purebred Beef Unit
 Sheep and Meat Goat Center
 Soil Carbon Center
 Swine Teaching and Research 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 1151	2019 Kansas Performance Tests with Winter Wheat Varieties
SRP 1152	2019 Kansas Performance Tests with Corn Hybrids
SRP 1153	2019 Kansas Performance Tests with Soybean Varieties
SRP 1154	2019 Kansas Performance Tests with Grain Sorghum Hybrids
SRP 1156	2019 Kansas Performance Tests with Sunflower Hybrids
SRP 1155	2020 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland
SRP 1157	2019 National Winter Canola Variety Trial

Research Reports 2019-2020

Cattlemen's Day
Hays Roundup Research Report
Agricultural Research, Southeast
Agricultural Research Center
K-State Turfgrass Research
Kansas Field Research
Kansas Fertilizer Research
Field Day, Southwest Research-
Extension Center
Swine Day

Special Publications

DRR18-19	Director's Report of Research in Kansas 2018-19
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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/>.

Kansas Agricultural Experiment Station reports are posted at <https://newprairiepress.org/kaesrr/>. They are listed by volume and issue (2020 Cattlemen's Day Research, Volume 6, Issue 2; <https://newprairiepress.org/kaesrr/vol6/iss2/>). Recommended citations and doi numbers are listed with each report.

Recommended Citation

Duncan, Z. M.; Tajchman, A. J.; Ramirez, M. P.; Lemmon, J.; Hollenbeck, W. R.; Blasi, D. A.; and Olson, K. C. (2020) "Effects of Prescribed Fire Timing on Stocker Cattle Performance, Native Plant Composition, Forage Biomass, and Root Carbohydrate Reserves in the Kansas Flint Hills: Year One of Six," Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 2. <https://doi.org/10.4148/2378-5977.7884>

Agricultural Economics

- 18-027-J Sorghum research and poverty reduction in the presence of trade distortions in Ethiopia
W. Embaye, N. Hendricks, N. Lilja
African Journal of Agricultural and Resource Economics
June 2017
Vol. 12, Issue 2
afjare.org/media/articles/6-Embaye-et-al-1.pdf
- 18-179-J Using a crop simulation model to understand the impact of risk aversion on optimal irrigation management
R.P. Wibowo, N.P. Hendricks, I. Kisekka, A. Araya
Transactions of the ASABE
2017
elibrary.asabe.org/abstract.asp?aid=48666
- 19-150-J Job attribute preferences of undergraduate agricultural majors—do they match with careers in grain merchandising?
K.D. Harris
Applied Economics Teaching Resources
June 2019
Vol. 1, Issue 1, Pg. 1-17
doi: 10.22004/ag.econ.294010
- 20-041-B Soil and water conservation: an annotated bibliography
C. Moorberg, S. Abit, A. Aubert, E. Brevik, M. Brungardt, R. Burns, E. Carver, I. Euler, M. Falk, K. Fross, T. Gillespie, B. Hogan, S. Indorante, M. Leakey, A. Lester, M. Owens, K. Patel, E. Pruvis, C. Sasscer III, L. Starr, D. Stich, M. Tynon, C. Weber, A. Williams, J. Ziggafoos
New Prairie Press
December 2019
kstatelibraries.pressbooks.pub/soilandwater/
- 20-163-J The BAITSSS model: An opportunity to integrate remote sensing and energy balance modeling for in-season crop water management
R. Dhungel, R. Aiken, X. Lin, P.D. Colaizzi, R.L. Baumhardt, D. O'Brien, D.K. Brauer
Proceedings of the 6th Decennial National Irrigation Symposium, ASABE
December 2021
doi.org/10.13031/irrig.2020-065
- 20-198-J Evaluation of uncalibrated energy balance model (BAITSSS) for estimating evapotranspiration in a semiarid, advective climate
R. Dhungel, R. Aiken, P.D. Colaizzi, X. Lin, D. O'Brien, R.L. Baumhardt, D.K. Brauer, G.W. Marek
Hydrological Processes
April 2019
Vol. 33, Issue 15
doi.org/10.1002/hyp.13458
- 20-199-J Restricted water allocations: Landscape-scale energy balance simulations and adjustments in agricultural water applications
R. Dhungel, R. Aiken, X. Lin, S. Kenyon, P.D. Colaizzi, R. Luhman, R.L. Baumhardt, D. O'Brien, S. Kutikoff, D.K. Brauer
Agriculture Water Management
January 2020
Vol. 227
doi.org/10.1016/j.agwat.2019.105854
- 20-200-J Increased bias in evaporation modeling due to weather and vegetation indices data sources
R. Dhungel, R. Aiken, P.D. Colaizzi, X. Lin, R.L. Baumhardt, S.R. Evett, D.K. Brauer, G.W. Marek, D. O'Brien
Agronomy Journal
April 2019
Vol. 111, No. 3, Pg. 1407-1424
doi:10.2134/agronj2018.10.0636

Agricultural Research Center - Hays

- | | | | |
|----------|---|----------|--|
| 18-220-J | Sorghum genotype performance in response to high temperature and stalk rot diseases
R. Perumal, S.S. Tomar, A.Y. Bandara, M. Djanaguiraman, P.V.V. Prasad, T.T. Tesso, H.D. Upadhyaya, C.R. Little
Oral invited presentation. Sorghum in the 21st century - Global conference on food, feed and fuel in a rapidly changing world
Cape Town, South Africa
April 2018 | 20-067-J | Strategic tillage effects on crops yields, soil properties, and weeds in dryland no-tillage systems
A.K. Obour, J.D. Holman, L.M. Simon, A.J. Schlegel
Agronomy
March 2021
Vol. 11, Issue 4
doi.org/10.3390/agronomy11040662 |
| 19-257-J | Evaluation of ethanol-based extraction conditions of sorghum bran bioactive compounds with downstream anti-proliferative properties in human cancer cells
S. Cox, L. Noronha, T. Herald, S. Bean, S-H. Lee, R. Perumal, W. Wang, D. Smolensky
Heliyon
May 2019
Vol. 5, Issue 5
doi.org/10.1016/j.heliyon.2019.e01589 | 20-069-J | Advancing provitamin A biofortification in sorghum: genome-wide association studies of grain carotenoids in global germplasm
C. Cruet-Burgos, S. Cox, B.P. Ioerger, R. Perumal, Z. Hu, T.J. Herald, S.R. Bean, D.H. Rhodes
The Plant Genome
March 2020
Vol. 13, Issue 1
doi.org/10.1002/tpg2.20013 |
| 20-031-S | 2019 Southwest Research-Extension Center Research Report
B. Gillen and multiple co-authors
Kansas Agricultural Experiment Station
Vol. 5, Issue 7
newprairiepress.org/kaesrr/vol5/iss7/ | 20-080-J | Herbicide programs to manage glyphosate-resistant and dicamba-resistant kochia (<i>Bassia scoparia</i>) in glyphosate plus dicamba-resistant soybean
R. Yadav, V. Kumar, P. Jha
Weed Technology
August 2020
Vol. 34, Issue 4
doi: 10.1017/wet.2020.3 |
| 20-036-S | 2019 Kansas Performance Tests with Winter Wheat Varieties
J. Lingenfelter and multiple co-authors
Kansas Agricultural Experiment Station
krex.k-state.edu/handle/2097/42015 | 20-082-J | Spring triticale forage responses to seeding rate and nitrogen application
A.K. Obour, J.D. Holman, A.J. Schlegel
Agrosystems, Geoscience and Environment
April 2020
Vol. 3, Issue 1
doi.org/10.1002/agg2.20053 |
| 20-061-J | Registration of 'KS Venada' hard white winter wheat
G. Zhang, T.J. Martin, A.K. Fritz, R. Regan, G. Bai, M.-S. Chen, R.L. Bowden, Y. Jin, X. Chen, J.A. Kolmer, B.W. Seabourn
Journal of Plant Registrations
January 2020
Vol. 14, Issue 2
doi.org/10.1002/plr2.20026 | 20-095-J | Variation in stalk rot resistance and physiological traits of sorghum genotypes in the field under high temperature
R. Perumal, S.S. Tomar, A. Bandara, D. Maduraimuthu, T.T. Tesso, P.V.V. Prasad, H. D. Upadhyaya, C.R. Little
Journal of General Plant Pathology
July 2020
doi.org/10.1007/s10327-020-00940-4 |

20-104-J	Integrating cover crops for weed management in the semi-arid U.S. Great Plains: opportunities and challenges V. Kumar, A. Obour, P. Jha, R. Liu, M.R. Manuchehri, A. Dille, J. Holman, P.W. Stahlman Weed Science April 2020 Vol. 68, Issue 4, Pg. 311-323 doi.org/10.1017/wsc.2020.29	20-234-S	2020 Hays Roundup Research Report K.R. Harmony, J.R. Jaeger, J.W. Waggoner, Q. Rupp Kansas Agricultural Experiment Station Vol. 6, Issue 3 newprairiepress.org/kaesrr/vol6/iss3/
20-118-S	2019 Kansas Performance Tests with Corn Hybrids, SRP1152 J. Lingenfelser and multiple co-authors Kansas Agricultural Experiment Station krex.k-state.edu/handle/2097/42016	20-270-J	Feral rye control in quizalofop-resistant wheat in central Great Plains V. Kumar, R. Liu, M.R. Manuchehri, E.P. Westra, T.A. Gaines, C.W. Shelton Agronomy Journal October 2020 Vol. 113, Issue 1 doi.org/10.1002/agj2.20484
20-125-J	Dissecting adaptive traits with nested association mapping: genetic architecture of inflorescence morphology in sorghum M.O. Olatoye, S.R. Marla, Z. Hu, S. Bouchet, R. Perumal, G.P. Morris G3: Genes Genomes Genetics May 2020 Vol. 10, Issue 5 doi.org/10.1534/g3.119.400658	20-275-J	Registration of the sorghum [<i>Sorghum bicolor</i> (L.) Moench] nested association mapping (NAM) populations in RTx430 background R. Perumal, G.P. Morris, S.V.K. Jagadish, C.R. Little, T.T. Tesso, S.R. Bean, J. Yu, P.V.V. Prasad, M.R. Tuinstra Journal of Plant Registrations May 2021 Vol. 15, Issue 2, Pg. 395-402 doi.org/10.1002/plr2.20110
20-130-S	2019 Kansas Performance Tests with Grain Sorghum Hybrids, SRP1154 J. Lingenfelser and multiple co-authors Kansas Agricultural Experiment Station krex.k-state.edu/handle/2097/42018	20-312-J	Effective two-pass herbicide programs to control glyphosate-resistant Palmer amaranth (<i>Amaranthus palmeri</i>) in glyphosate/dicamba-resistant soybean V. Kumar, R. Liu, D.E. Peterson, P.W. Stahlman Weed Technology August 2020 Vol. 35, Issue 1, Pg. 128-135 doi: 10.1017/wet.2020.90
20-159-J	Potential yield loss in grain sorghum (<i>Sorghum bicolor</i>) with weed interference in the United States J.A. Dille, P.W. Stahlman, C.R. Thompson, B.W. Bean, N. Soltani, P.H. Sikkema Weed Technology January 2020 doi.org/10.1017/wet.2020.12	20-325-J	Rapid quantification of total phenolics and ferulic acid in whole wheat using UV-Vis spectrophotometry W. Tian, G. Chen, Y. Gui, G. Zhang, Y. Li Food Control May 2021 Vol. 123 doi.org/10.1016/j.foodcont.2020.107691
20-206-J	Dryland cropping system impact on forage accumulation, nutritive value, and rainfall use efficiency J.D. Holman, A. Schlegel, A. Obour, Y. Assefa Crop Science January 2020 Vol. 60, Issue 6 doi.org/10.1002/csc2.20251	20-334-S	2019 Kansas Performance Tests with Sunflower Hybrids, SRP1157 J. Lingenfelser and multiple co-authors Kansas Agricultural Experiment Station krex.k-state.edu/handle/2097/42019

20-346-J	Cover-crop water use and productivity in the high plains wheat–fallow crop rotation J.D. Holman, Y. Assefa, A.K. Obour Crop Science October 2020 Vol. 61, Issue 2 doi.org/10.1002/csc2.20365	18-031-J	Expression of a rice soluble starch synthase gene in transgenic wheat improves the grain yield under heat stress conditions B. Tian, S.K. Talukder, J. Fu, A.K. Fritz, H.N. Trick In vitro Cellular & Developmental Biology - Plant 3/6/18 Vol. 54, Pg. 216-227 doi.org/10.1007/s11627-018-9893-2
20-353-J	Genetic analysis of end-use quality traits in wheat G. Zhang, R.Y. Chen, M. Shao, G. Bai, B.W. Seabourn Crop Science January 2020 Vol. 61, Issue 3 doi.org/10.1002/csc2.20411	18-075-J	Within-row plant spacing effects on corn yield: Field-study and literature review G.M. Corassa, R. Gaviraghi, M.B. Bisognin, A.L. Santi, F.D. Hansel, R.A. Schwalbert, T.J.C. Amado, I.A. Ciampitti Agronomy Journal January 2018 Vol. 110, Issue 1 doi.org/10.2134/agronj2017.07.0380
Agronomy			
18-001-J	Planting alfalfa with cover crops on forage dry matter and nutritive values of alfalfa D. Min, I. McDonald Journal of Agricultural Studies 2020 Vol. 5, No. 2 doi.org/10.5296/jas.v5i2.11408	18-103-B	Spoil to soil: Mine site rehabilitation and revegetation N.S. Bolan, M.B. Kirkham, Y.S. Ok Publisher: CRC Press, Taylor & Francis Group 2018
18-002-J	Using jeopardy game in a forages course D. Min, A. Mustain North American Colleges and Teachers of Agriculture March 2017 Vol. 61, Pg. 92-94	18-175-J	Improving gene regulatory network inference by incorporating rates of transcriptional changes J.S. Desai, R.C. Sartor, L.M. Lawas, S.V.K. Jagadish, C.J. Doherty Scientific Reports December 2017 doi.org/10.1038/s41598-017-17143-1
18-020-B	Considering soil potassium pools with dissimilar plant availability M.J. Bell, M.D. Ransom, M.L. Thompson, A. Florence, P.W. Moody, C.N. Guppy Book: Improving Potassium Recommendations for Agricultural Crops 2021 doi.org/10.1007/978-3-030-59197-7	18-206-J	Carbon sequestration value of biosolids applied to soil: A global meta-analysis H. Wijesekara, K. Colyvas, P. Rippon, S.A. Hoang, N.S. Bolan, M.C. Manna, R. Thangavel, B. Seshadri, M. Vithanage, Y.M. Awad, A. Surapaneni, C. Saint, G. Tian, S. Torri, Y.S. Ok, M.B. Kirkham Journal of Environmental Management April 2021 Vol. 284 doi.org/10.1016/j.jenvman.2021.112008

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K.M. Capps, R.G. Amachawadi, M.B. Menegat, J.C. Woodworth, K. Perryman, M.D. Tokach, S.S. Dritz, J.M. DeRouchey, R.D. Goodband, J. Bai, M.D. Apley, B.V. Lubbers, T.G. Nagaraja
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- 20-163-J The BAITSSS model: An opportunity to integrate remote sensing and energy balance modeling for in-season crop water management
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Z. Alasmay, T. Todd, G.M. Hettiarachchi, T. Stefanovska, V. Pidlisnyuk, K. Roozeboom, L. Erickson, L. Davis, O. Zhukov
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R. Perumal, G.P. Morris, S.V.K. Jagadish, C.R. Little, T.T. Tesso, S.R. Bean, J. Yu, P.V.V. Prasad, M.R. Tuinstra
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D.-H. Koo, B. Friebe, B.S. Gill
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Southeast Research and Extension Center

18-339-J Nitrogen management to improve nutritive value of endophyte-free tall fescue grown on claypan soil
D.W. Sweeney, J.K. Farney, J.L. Moyer
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D.W. Sweeney, G.M. Pierzynski, P.L. Barnes
Agrosystems, Geosciences & Environment
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R.P. Lollato, J.F. Lingenfelser, C.L. da Silva, G. Sassenrath
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The Community Resilience Handbook
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J.D. McNutt and multiple co-authors
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D.W. Sweeney, D.A. Ruiz-Diaz
Agrosystems, Geosciences & Environment
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20-291-J Predicting winter wheat heading date: A simple model and its validation in Kansas
H.D. Zhao, G.F. Sassenrath, Z.T. Zambreski, L. Shi, R. Lollato, E. De Wolfe, X. Lin
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Southwest Research-Extension Center

18-214-B Feeding and watering beef cattle during disasters
J.W. Waggoner, K.C. Olson
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