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AgReport

KANSAS STATE
UNIVERSITY



Preserving Kansas water quality

Water for the Future

Plants, animals, and people depend on water. To address water issues faced by Kansas citizens, K-State Research and Extension focuses on conducting relevant water research, collaborating with various organizations and institutions, and educating Kansans on water quality and conservation.

Dan Devlin (BS '79, MS '83), director of the Kansas Center for Agricultural Resources and the Environment (KCARE) and the Kansas Water Resources Institute, oversees a broad range of water projects and assists with the annual Governor's Conference on the Future of Water in Kansas.

Ogallala importance

Water discussions in western Kansas often focus on irrigation, drought, and the Ogallala Aquifer, an underground water table underlying about 174,000 miles in Kansas and seven other states from South Dakota to Texas. It yields about 30 percent of the nation's groundwater used for irrigation and drinking water to 82 percent of the people who live within the aquifer boundary.

Eight counties in western Kansas that are among those relying on the aquifer — Haskell, Scott, Gray, Grant, Finney, Wichita, Seward, and Ford — together sold more than \$6.3 billion in crops and livestock, slightly more than one-third of total agricultural revenue for the entire state.

K-State published a study showing that current irrigation trends could deplete 69 percent of the groundwater in the Ogallala Aquifer within 50 years, drastically affecting the lifestyle and profitability of the area. To preserve the aquifer, K-State teamed with the U.S. Department of Agriculture's



Isaya Kisekka (left), agricultural engineer at the Southwest-Research Extension Center—Garden City, inspects hoses used for mobile drip irrigation with Monty Teeter, farmer and CEO of Teeter Irrigation.

Agricultural Research Service, as well as Texas Tech, Texas A&M, and West Texas A&M universities to study the aquifer and how to preserve it.

For its work and dedication to finding water-saving solutions, the research team earned the 2013 USDA Secretary's Honor Award in the category of enhancing economic vitality and quality of life in rural America.

Irrigation practices

Center pivot systems, a method of crop irrigation where equipment rotates around a pivot and crops are watered with sprinklers, have been used for

decades; however, some of that sprayed water can and does evaporate instead of reaching the crops.

For more than 25 years Freddie Lamm (PhD '90), research irrigation engineer at the Northwest Research-Extension Center, has done extensive studies and education on subsurface drip irrigation. SDI delivers water directly to plant roots through buried drip tape.

Irrigation engineers Dan Rogers (BS '76, MS '77), Jonathan Aguilar (PhD '09), and Isaya Kisekka are testing a new irrigation option that combines the two systems.



Brad Beckman

K-State researchers are testing drip lines attached to center pivot irrigation systems.

“Mobile drip technology integrates drip irrigation with a center pivot by replacing nozzles with drip lines,” said Kisekka, Southwest Research-Extension Center. “Retrofitting existing systems at a minimum cost is appealing to producers. There is much interest but little data.”

The lines, sometimes called dragon lines, are hard hoses similar to those used in landscapes or vineyards. The engineers are looking at many factors, including how the hoses hold up to being dragged along the ground, how it would work with limited or no-till operations, and how to accurately plant crops in a circle to center the lines between rows.

The research team works directly with local producers to evaluate the system. To compile complete data on the project, the team includes an agricultural economist to do a cost-benefit analysis and an entomologist to evaluate insect issues.

Planning for the future

At the 2012 Governor’s Conference on Water, Gov. Sam Brownback (BS ’79) issued a call to action for a Vision for the Future of Water Supply in Kansas to address the state’s current and future water needs. A team from the Kansas Department of Agriculture and the Kansas Water Office set out to evaluate the water needs.

According to the KWO website, “a guiding principle of the vision is that locally driven solutions have the highest opportunity for long-term success. With that in mind, the vision outlines a process for water supply goals to be established by regions by stakeholders as a means for measuring success and implementing the vision.”

To gather the necessary information from stakeholders, the state agencies looked to K-State Research and Extension for assistance.

On April 16, Secretary of Agriculture Jackie McClaskey (BS ’93, PhD ’14) and Tracy Streater, Kansas Water Office director, sent a letter to Dean and Director Floros, which he shared with faculty and staff.

“On behalf of the KDA and KWO, we wish to extend our deepest appreciation for the support of Kansas State University in the regional water supply goal development

process. For the past 10 weeks, nearly 70 staff from K-State Research and Extension and more than 10 staff from the K-State Institute for Civic Discourse and Democracy through the state partnered with our agencies to facilitate more than 50 orientation meetings, public outreach events, and work sessions for the 14 Regional Goal Leadership Teams identified in the Vision for the Future of Water Supply in Kansas. Without the talent and dedication of the KSRE and ICDD staff, this process would not have been a success.”

Kansas Agricultural Watershed Field Laboratory

By creating 18 small watersheds and monitoring the water runoff, K-State agronomists are studying the effects of cover crops and phosphorus fertilizer management on water quality and crop growth.

Watersheds are areas where all the water — underneath or draining off the



Dan Donner

Agronomy student Erin Bush checks one of the water monitoring systems at the Kansas Agricultural Watershed Field Laboratory.



Agronomist Peter Tomlinson (right) and Barrett Smith, agronomy master's student, discuss the next step to install the flume, which captures water runoff from poultry litter.

land — goes into the same place. These watersheds were created by terracing 1.2- to 1.6-acre tracts of land and installing flumes to capture the runoff. Automated equipment measures the rainfall and analyzes water quality.

Nathan Nelson (BS '98), associate professor of agronomy, proposed the study and leads the project.

The sites are planted to a corn-soybean rotation with six phosphorus fertilizer treatments. Each treatment is studied with and without a cover crop, which is a crop grown for the protection and enrichment of the soil and to reduce phosphorus loss and improve water quality.

“Toxic algal bloom in reservoirs are partially caused by phosphorus runoff,” Nelson said. “We are developing best management practices (BMPs) that producers can implement to reduce runoff.”

The project is supported by the 4R Research Fund (nutrientstewardship.com), the Kansas Soybean and Corn commissions, and K-State Research and Extension. Watch a video at https://youtu.be/_vsKEOdYH8M.

Master's student David Abel, Wichita, and Erin Bush, junior from Indiana, are assisting Nelson with the project.

Bush was a member of the K-State Soils Judging Team coached by Professor Mickey Ransom and earned fourth place in the national soils judging contest. She will compete at the international contest in Hungary.

After completing her bachelor's degree, Bush plans to pursue a master's degree and work in a job related to soil science.

Poultry litter

Producers in southeast Kansas are using poultry litter — a mixture of poultry manure and bedding material such as sawdust, wood shavings, or rice hulls — to reduce fertilizer costs and improve soil fertility. While there are economic advantages, the practice can cause odor and water-quality issues without proper management.

Kansas is not a major poultry-producing area compared to neighboring states Missouri, Arkansas, and Oklahoma, where manure management and environmental regulations have decreased the acreage available to distribute poultry litter.

Shipping poultry litter to Kansas seemed like a win-win situation for producers; however, concerns about water quality and odor from improperly stored and applied litter resulted in citizen complaints to the Kansas Department of Health and

Environment (KDHE). In response, a collaborative effort among the KDA-Division of Conservation, KDHE, Natural Resource Conservation Service, local Watershed Restoration and Protection Strategy (WRAPS) groups, Kansas Farm Bureau, K-State Research and Extension, and other agricultural producer organizations led to the development of a producer education program and on-farm research to evaluate storage practices.

KDA-DOC, KDHE, and WRAPS groups provided financial resources for a voluntary, incentive-based conservation program using state and federal cost-share dollars. K-State Research and Extension developed the Poultry Litter 101 education program to address the composition, fertilizer value, appropriate application rates based on crop nutrient needs, and best management practices to minimize nutrient runoff and odor from the storage and land application.

A site evaluation tool developed by K-State provides producers with a metric to evaluate the suitability of potential infield storage sites and takes into consideration site conditions such as proximity and slope to waterways, soil type, size and type of buffer, and distance to neighboring homes and water wells.

Master's student Barrett Smith is working for Peter Tomlinson, assistant professor of agronomy and extension specialist for environmental quality, to evaluate the nutrients in the runoff from a poultry litter storage site and designated buffer area in southeast Kansas.

“This information will be important for improving design recommendations to minimize the loss of phosphorus,” said Tomlinson.

Military concerns

K-State also is working with Fort Riley personnel, the Environmental Protection Agency Office of Research and Development, and EPA Region 7 to develop strategies for meeting the Department of Defense Net Zero Water goals.

For information on more projects, go to www.kcare.k-state.edu.

By Gloria Holcombe and Kaitlin Morgan