

Global collaboration is unlocking wheat's genetic potential

MANHATTAN — In a paper published Wednesday, Nov. 25, in *Nature*, Kansas State University researchers, in collaboration with the international 10+ Genome Project led by the University of Saskatchewan, have announced the complete genome sequencing of 15 wheat varieties representing breeding programs around the world — an invaluable resource to improve global wheat production.

This effort gained momentum in 2018 when the Kansas State University team, in collaboration with the International Wheat Genome Sequencing Consortium, published the genome assembly of Chinese Spring, the first complete reference genome of bread wheat. With rapid advances in DNA sequencing technology, and with experience from assembling the first wheat genome, the 10+ Genome Project brought together the expertise and resources of more than 95 scientists from universities and institutes in Canada, Switzerland, Germany, Japan, the U.K., Saudi Arabia, Mexico, Israel, Australia and the U.S.

This study represents the start of a larger effort to generate thousands of genome sequences of wheat, including genetic material brought in from wheat's wild relatives.

"It's like finding the missing pieces for your favorite puzzle that you have been working on for decades," said project leader Curtis Pozniak, wheat breeder and director of the University of Saskatchewan Crop Development Centre. "By having many complete gene assemblies available,

we can now help solve the huge puzzle that is the massive wheat pan-genome and usher in a new era for wheat discovery and breeding."

"Our team was uniquely suited to represent U.S. wheat in this effort here in America's breadbasket and as a land-grant institution with a strong history in wheat research," said Jesse Poland, associate professor at Kansas State University and director of the Feed the Future Innovation Lab for Applied Wheat Genomics and the Wheat Genetics Resource Center-University Cooperative Research Center. "We are fortunate to have world leaders in breeding and genetics under one roof, and generous support from the National Science Foundation, Kansas Wheat and many others."

"The Kansas team was responsible for sequencing and analyzing the hard red winter wheat variety Jagger, released in 1994 by the Kansas State University breeding program, now led by Allan Fritz. Jagger was a landmark wheat variety in the Great Plains and covered millions of acres for many years. It was selected for this project because of its relevance as a breeding parent as it is found in the pedigrees of current varieties across the U.S."

"Because of our collaboration in this project, we've had access to this phenomenal genomics resource as it's been built, which has already led to tremendous discovery," Poland said. "K-State plant genetics graduate student Emily Delorean is using data from the 10+ Genomes Project to develop

a comprehensive analysis of important quality genes and develop better molecular breeding tools, which will have a huge impact on bread making."

"In a companion publication published in *Theoretical and Applied Genetics*, Kansas State University scientists Liangliang Gao, Dal-Hoe Koo and team completed detailed characterization of the 2N introgression, a chromosome segment that was transferred from wild wheat relative *Aegilops ventricosa*, which is found in Jagger, but was not present in the original Chinese Spring reference genome. The 2N segment possesses resistance genes to multiple wheat diseases, including stem and leaf rust, nematodes and the emerging wheat blast disease. The team found that this chromosome segment is present in about 80% of Kansas wheat lines and also a large proportion of wheat around the world, marking its importance toward addressing global wheat improvement."

"Progress of this magnitude is only possible because of the strength of the international wheat breeding network and strong international collaborations in wheat research," said Justin Gilpin of Kansas Wheat. "It is exciting for the Kansas wheat growers to be part of this excellent work."

The work at Kansas State University was supported by the NSF, Kansas Wheat, the United States Agency for International Development, and the National Institute of Food and Agriculture

Rural, healthy food access initiatives align more closely with state's extension service

Programs help to serve food needs of Kansas' rural communities

MANHATTAN, Kan. — A pair of programs that help to provide healthy food to under-served areas of Kansas have found a new home.

The Kansas Healthy Food Initiative and the Rural Grocery Initiative with the statewide K-State Research and Extension network, a change that is being welcomed by the program's coordinators.

"I have high hopes that this new relationship will expand the reach of both programs and K-State Research and Extension across the state of Kansas and the country," said Rial Carver, an extension specialist who works closely with both programs.

David Procter, former director of the Center for Engagement and Community Development where the programs were previously located, said the transition makes good sense.

"As we have worked in communities, we've reached out to extension professionals who have often stepped up and assisted us with workshops or our summits," Procter said. "It will be very nice to institutionalize the connection of K-State Research and Extension and this food access work."

The Rural Grocery Initiative started in 2007 to help sustain and enhance independently-owned rural grocery stores. The Kansas Healthy Food Initiative, launched in 2017, is a public-private partnership that aims to increase access to healthy food in low-resource and underserved areas of the state by providing financial and technical assistance.

It is estimated that there are 200 grocery stores in Kansas communities of 2,500 residents or less. However, Carver noted that from 2008 to 2018, more than 50 rural grocery stores closed in the state.

"That's 50 cities where residents now have to travel out of town to get groceries," she said. "Those cities are losing out on economic, social and health benefits due to the loss of their grocery store."

Procter noted that grocery stores are "anchor businesses" in many rural towns, along with churches, post offices, schools and a few others. It is estimated that grocery stores generate one in every five tax dollars in their rural communities.

"Rural communities are the heart and soul of Kansas," Procter said. "While we certainly have important and vibrant urban centers,

farms and rural communities represent the heritage and image of Kansas. When grocery stores close, rural communities struggle to sustain other businesses and keep and attract new residents. The soul of Kansas — its small towns, small farmers and small business owners — is damaged."

Since the launch of the Kansas Healthy Food Initiative in 2017, 18 healthy food retail projects have been funded across the state of Kansas and technical assistance has been provided to communities in more than half of the state's 105 counties.

While the transition is already taking shape, the two programs won't officially be part of the state's extension network until July 1, said Gregg Hadley, director for extension.

"K-State Research and Extension has a long history of providing educational programs around food production, systems, policy, and safety," Hadley said. "We are also deeply involved in educating on the linkages between food, healthy living, and community prosperity and resiliency."

"As such, bringing the Rural Grocery Initiative and the Kansas Healthy Food Initiative under the K-State Research and Extension banner was a natural transition, especially when you consider how we have always been a collaborator with those two initiatives."

Hadley said efforts to improve access to food are good for rural communities.

"Strong and healthy local food systems are vital to farm and ranch prosperity, healthy people and strong, thriving communities," he said. "These two programs help to ensure that those things happen."



With Love, From Kansas

Kim Baldwin, McPherson County farmer and rancher

As the countdown to Christmas officially begins, the hustle and bustle of the season already has a different feel from holidays past. My family has decided that since our celebrations will be radically different — void of hustling across the Midwest and attending multiple family gatherings — we will slow our other traditional hustle and bustle as well.

For my family, who generally completes Christmas shopping in a mad dash just days before Christmas, we have already started squirreling away gifts for loved ones. Similar to that extra package of toilet paper I've routinely added to my grocery pick-up orders since last spring, we've actually done quite a bit of gift planning and early purchasing this year.

My husband and I have decided that all of our Christmas shopping will conclude by the end of this week. We've been quite intentional this year with gifting decisions. Supporting more local businesses, ordering items from stores offering curbside pick-up

services and placing orders with Kansas producers who ship their products.

I have found myself utilizing Shop Kansas Farms on both Facebook and through their website at www.shopkansasfarms.com to see what kind of goodies I can find to share with loved ones this holiday season.

The concept of Shop Kansas Farms is quite simple: providing a direct link between consumers and Kansas farm and ranch families who sell meat, dairy, veggies and other homegrown products. It's been so fun to search through the interactive map of Kansas highlighting the people offering great products from their farms and ranches.

The list is quite impressive and goes well beyond meat, milk and eggs. From pork rinds to popcorn, cheese curds to jams, beef, pork or lamb sticks to farm-roasted coffee, there's so many goodies to find to make the perfect gift box to deliver to loved ones near or mail to loved ones afar.

It's been enlightening for me to see so many farm and ranch families get creative with their marketing strategies, and how so many

producers have pivoted the way they get their goods to consumers or have partnered with other producers to offer more options. It's also been so fun to see how consumers view these interactions with farm and ranch families.

People are connecting with others and learning about their neighbors. Kansans are supporting Kansans by placing orders and making product recommendations. Relationships are being built, and it's all being done online during a time where practicing social distancing is needed.

While many families like mine have decided to keep it simple this year and to resist the traditional hustle and bustle of the season, it's so good to know that while we won't be together in person, our family that's scattered across the country can still receive our love through our hand-picked selections of local products that are grown and produced on Kansas farms and ranches just like mine.

It's a gift of love from Kansas I plan to continue to give well after we can once again gather with those whom we will dearly miss this year.

K-State expert touts food safety resource

'Feed Your Mind' outlines health, safety of genetically engineered foods

MANHATTAN, Kan. — Knowledge, it is said, is power. When it comes to the foods we eat, it is also an avenue to safety.

That's one reason why Kansas State University food safety specialist Karen Blakeslee keeps an eye on a program from the U.S. Food and Drug Administration that helps consumers better understand genetically engineered foods, commonly called GMOs.

"Despite there being a wide range of foods available to consumers — GMO and non-GMO — there is some confusion around what GMOs are and how they are used in our food supply," said Blakeslee, who is also coordinator of the university's [Rapid Response Center for food science](#).

Earlier this year, the FDA launched the program, *Feed Your Mind*, to educate consumers about GMOs.

"The program provides

consumers with science-based, educational information to better understand how GMOs are made, learn more about the types of crops that have been modified, address questions they have about health and safety of GMOs, and explain how GMOs are regulated in the United States," Blakeslee said.

Safety, she added, is the bottom line.

"Consumers want to know about food and the many factors that go into providing safe food to feed themselves and their families," Blakeslee said. "So, transparency is key to educate consumers for a nutritious and safe food supply from farm to table."

In the United States, the FDA works closely with the Environmental Protection Agency and the U.S. Department of Agriculture to ensure the safety of GMO foods and plants. Those agencies also help food companies understand the rules they need to follow when creating plants

through genetic engineering to heighten their safety.

Blakeslee said that beginning in January, 2022, certain types of GMOs will require a disclosure that lets consumers know if the food itself or ingredients used to make the food are bioengineered.

"At that time," she said, "foods sold in the United States that meet the definition of bioengineered food must have information on their packaging using one of the approved methods, including text on the package that says 'bioengineered food,' the bioengineered food symbol, or directions for using your phone to find this disclosure."

The FDA provides numerous fact sheets and videos — in English and Spanish — on the *Feed Your Mind* website.

More information about food safety is available from K-State Research and Extension's Food Safety website.

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