

## Has Wheat Gluten Changed Over Time?

For most Celiacs, all they want to be able to do is have their wheat and eat it too. However, when people have celiac disease, any gluten they digest automatically damages their small intestine. That's why Dr. Chris Miller, a former faculty member at Kansas State University in Grain Science and Industry, now the director of wheat quality research at Heartland Plant Innovations, is trying to come up with a way for Celiacs to be able to consume gluten without the repercussions their body has towards it.

While the long-term goal is to develop a wheat that would be safe for people with celiac disease to eat, this research is only the first step on that journey. Miller says, "We are characterizing wheat proteins important for both health and nutrition all the way to product quality, to give us a better understanding of celiac disease and protein reactivity."

The research began with studying different wheat varieties from the Kansas State University breeding program. They call it a diversity panel, which has a wide range of genetic diversity throughout the wheat plants looked at. That involved 50 Hard Red Winter wheat lines, which are made up of commercial varieties - ones that are currently grown, older varieties that were grown years ago but not planted much anymore, and wild relatives of wheat, in addition to 50 Hard Red Spring wheat lines that do not come from Kansas but show wheat quality related to the breeding program.

"With these different varieties we can get a broad understanding of how genetics change over time, or if they have changed through our breeding selection," Miller said.

Miller and his colleagues started by characterizing the varieties' traits from the field all the way through their protein characterization, their genetic makeup (which involves the plants' genotypes), end-product testing (which examines the plants' milling and baking qualities), and health and nutrition attributes.

The research they have been conducting is into the third year, and they still don't have the answers they need. "It's a really slow, long process. Growing plants in the field is a slow process. Gathering the tissue, gathering the seed, getting the milling, getting all the product quality. It's just been incredibly slow," Miller said.

The researchers should be getting data in January regarding all the wheat plants tested, which will mean answers to many of the questions they have. At this point, they are not sure what those answers will be.

Aaron Harries, Vice President of Research and Operations at Kansas Wheat, said this is discovery research. "We're not sure what we are going to find. The first stage is the exploratory stage and getting a base knowledge about wheat proteins. There's a lot of optimism, but a lot of uncertainty," Harries said. He said once they get the base

knowledge completed, they will be able to learn more about the varieties.

Kansas wheat farmers are funding this research project through the Kansas Wheat Commission's two-cent wheat assessment. In terms of research in general, the funding is small. "We're getting about \$130,000 per year, but we could easily use a million," Miller said. He stated that within the next year, they will have collected enough data and proof of concept that they'd be able to go out and apply for more funding opportunities.

After the preliminary research is complete, it may be necessary to collaborate with medical partners in order to reach the long-term goal: to help those with celiac disease be able to consume wheat products without any digestion problems.

"This is a study that's focused for the good of all human health. We're doing research here that they aren't doing anywhere else," Jordan Hildebrand, Program Assistant at Kansas Wheat, said. "The fact that Kansas wheat farmers took the initiative to fund the research showed their foresight and their desire to deliver a wholesome product for everyone who wants to have their bread and eat it too."