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Patent Focus: The trick to patent success

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The trick to patent success

Plant pathologist's patent portfolio benefits farmers, researchers

By Pat Melgares

A Kansas State University researcher has received two big thumbs up from the U.S. Patent and Trademark Office for his collaborative wheat work.

Under the leadership of Harold Trick, professor of plant pathology, the university is involved with two wheat-related patents: an approved patent to stop wheat viruses from reproducing and a pending patent to improve the crop's resistance to heat.

"Both of these projects do have a valid product in the end," Trick said. "That's a positive thing."

Trick, who has worked at K-State since 1998, has received eight patents for his work, which places him in the top seven of all-time inventors at the university. If approved, the heat stress project would mark his ninth patent.

Trick received his eighth patent in March 2018 for work to silence — or shut down — a gene that many viruses use to reproduce in wheat. Trick and K-State scientists, in conjunction with U.S. Department of Agriculture Agricultural Research Service, used biotechnology tools to provide protection against wheat streak mosaic virus, Triticum mosaic virus and possibly even the barley yellow dwarf virus.

Trick's pending patent is for work that improves wheat's ability to grow in hot temperatures. The researchers looked specifically at how heat affects wheat during the grain filling stage and studied an enzyme called starch soluble synthase.

Harold Trick investigates test tubes of wheat samples.

"What that gene does is convert sugars to starch in the endosperm of the seed," Trick said. "Unfortunately, this wheat gene doesn't like the heat. Typically in Kansas, this grain fill period usually occurs between the end of May or early June, and it can be extremely hot during those times. That's a potential for loss of yield."

The researchers looked for a starch synthase gene in other crops grown in hot conditions and found that a rice gene provided a 30 to 35 percent increase in wheat grain size when wheat was grown at 86 degrees Fahrenheit.

"That's exciting," Trick said. "And it has tremendous potential in the field. It's not a cure-all for entire heat stress, but it's one component."

Transgenic wheat plants are not approved for U.S. production, but the university's work helps scientists quickly test how effectively genes can produce desirable traits in wheat.

"We can use biotechnology to validate other avenues of research," Trick said. "For example, if K-State collaborators find a gene that is potentially valuable, we can use biotechnology to confirm its function by either turning off its expression or over-expressing the gene."

Trick said this validation could be done in a matter of months, rather than a decade or more through traditional breeding techniques.

"We've also noticed that there's no penalty in other agronomic traits when we use these genes, whether we are using the rice gene for heat tolerance or for shutting off the endogenous wheat gene for the virus work," Trick said.

The work was funded by Kansas wheat farmers through the Kansas Wheat Commission. John Fellers, a K-State adjunct professor of plant pathology and USDA Agricultural Research Service scientist, and Jessica Rupp, assistant professor of plant pathology, were instrumental in the virus project. Allan Fritz, wheat breeder and professor of agronomy, is helping with the heat studies. See page 27 to read more about K-State wheat research. *k*