AgriLife Research wheat studies pay off

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Research came full circle on April 16 as the Animal and Plant Health Inspection Service amended the Karnal bunt quarantine areas in Arizona, California and Texas, according to a Texas AgriLife Research scientist.

"The research is finally paying off," said Dr. Charlie Rush, AgriLife Research plant pathologist, of the action by APHIS to lift the restrictions on the interstate movement of Karnal bunt regulated wheat from certain areas in all the three states. Texas has no further restrictions, however, Arizona still has one remaining area under quarantine.

"Sometimes it takes years to realize the impact of a specific research project, but this is a perfect example of where research allowed the government to make changes, and today the producers get the final payoff," Rush said.

Rush and his associates, through work in the AgriLife Research High Plains Plant Pathology Laboratory and Plant Disease Diagnostic Laboratory, spent five years working on Karnal bunt to provide federal agencies information demonstrating the disease would not explode and cause significant disease outbreaks, even under optimum environmental conditions.

Karnal bunt is a fungal disease of wheat, first observed in the U.S. in 1996. The disease causes wheat kernels to be damaged by fungal teliospores. Each infected kernel can produce many reproductive spores and aid in the spread of the disease, Rush said. Bunted wheat can have an impact on flour quality by causing a fishy odor, but it is not toxic to

humans or livestock.

In 2000, a federal order under the Plant Protection Act prohibited or restricted the movement in interstate commerce of any plant, plant part or article to prevent the dissemination of a plant pest within the U.S.

"When they first found Karnal bunt near Wichita Falls and San Saba, everything within a certain diameter around the field was quarantined," Rush said. "While it was never really a significant disease, the political ramifications and export issues grew and many producers suffered great losses."

Specifically, a region near Olney, including Archer, Baylor, Throckmorton and Young counties, and a region near San Saba, including McCulloch and San Saba counties, were placed under restriction.

Texas A&M System economists at the time estimated the fungal disease hurt the Rolling Plains regional economy to the tune of more than $27 million in the first year.

"The real tragedy of all of this was the producers it affected," said Stan Bevers, Texas AgriLife Extension Service economist in Vernon. "They had restrictions placed on them from moving their wheat and cattle that had grazed on the pastures. Producers found their land values dropping and their equity evaporating."

Karnal bunt can infect flowering plants if they come in contact with spores, primarily when temperatures are cool and rainfall and humidity are high. Researchers warned producers the spores could be spread from field to field on plants, seeds, soil, farm equipment, tools, vehicles or on the wind. Once in the soil, the spores can survive for as long as five years.

Rush said the five-year waiting period with negative results in these fields is what has finally been met, allowing the restrictions to be lifted.

David Marshall, a Texas A&M wheat researcher and director of the Dallas screening lab which handled all the Texas samples at the time, started the early diagnostic work, but he later moved to a new position with the U.S. Department of Agriculture-Agricultural Research Service in North Carolina.

With Marshall's departure, Rush said he was contacted by George Nash, state operational officer for APHIS in Austin, to pick up the research needed.

"Even though Karnal bunt wasn't a concern up here in the Texas Panhandle, as a wheat pathologist I just felt responsible to the growers in the state and took on the project," Rush said.

Rush, along with associates Dr. Jeff Stein, Dr. Tom Allen and Dr. Fekede Workneh, began concentrating on distribution and density of fungal spores and the movement of teliospores in the soil from a single-point introduction.

This allowed them to estimate how and when the pathogen was introduced in a field, and how rapidly the spores might be distributed across the field, he said. This information was used to develop a pest risk assessment, which is a prerequisite for federal deregulation.

Rush, working in collaboration with Dr. Bob Bowden on a federal initiative through the USDA-Agricultural Research Service and Kansas State University, was able to set up a Karnal bunt quarantine laboratory - the only state agriculture research station lab federally approved by USDA-APHIS for research on Karnal bunt.

In addition, the Texas High Plains Plant Pathology Diagnostic Laboratory, a part of the Great Plains Diagnostic Network, was subsequently established as an offshoot of Rush's work with Karnal bunt.

"Having the quarantine lab allowed us to actually work with the living organism," he said. "Obviously, there were a lot of safety precautions that had to be taken and strictly adheered to, especially since we were in the middle of wheat country."

By 2005, their studies indicated the spores of the Karnal bunt pathogen were not readily spread by conventional tillage equipment; that widespread distribution of teliospores existed in naturally infested fields in Texas and Arizona, suggesting the pathogen was likely to have existed for many years prior to its initial detection; and that it was probably spread through infested seed or manure.

Rush said despite the widespread incidence of fungal spores in field soils, disease incidence and severity was never high in Texas. The Karnal bunt lab has recently been closed and the project monies reallocated.

"Our research, in combination with work by USDA scientists and APHIS personnel, provided justification for the USDA to modify their rules. APHIS changed the rule to say if a field tested negative for five years, it could be taken out of restriction," Rush said.

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