

An integrated approach to managing stripe rust in wheat

by Kieran Brett

In the face of an evolving disease threat, this wheat breeder has developed better tools to deal with stripe rust. Support from ACIDF and ALMA helped make it possible.

For Alberta's wheat growers, and for livestock producers who purchase a healthy portion of the crop, the last few years have brought some disconcerting news.

The disease known as stripe rust, pictured right, which can reduce yields up to 40% if left unchecked, is on the move. As Harpinder Randhawa, pictured below explains, this is true on a couple of levels.

“In the past, the disease was mostly found in the United States Pacific Northwest and



southern Alberta regions,” says Randhawa, a Spring Wheat and Triticale Breeder with Agriculture and Agri-Food Canada in Lethbridge. “Stripe rust tends to like cooler temperatures. More recently, though, we’ve also seen quite a dramatic shift in the pathogen as it has evolved for higher temperatures and drier climates.”

With wheat accounting for \$6 billion in yearly crop sales in Western Canada, Randhawa was determined to find a more sustainable set of solutions to stripe rust.

Beginning in 2012, he led a four-year project to better understand the distribution of the disease in wheat in Alberta, and develop tools to reduce the agronomic and economic risk to growers. This work was supported by the Alberta Crop Industry Development Fund (ACIDF), under the \$8 million Feeding Initiative funded by the Alberta Livestock and Meat Agency (ALMA).

Three project goals

At one time, growers concerned about stripe rust might have rested their hopes on a new fungicide or registration of one or two new wheat varieties with some degree of resistance. Today, Randhawa believes the response needs to be multi-dimensional and integrated.

“Fungicides can’t be the only option since you want to be cautious of the environment when using chemicals, but also because it adds extra cost for the growers,” says Randhawa. “Integrating genetic resistance is environmentally friendly, and selecting genes for stripe rust resistance is relatively easy compared to some other diseases like Fusarium head blight.”

Randhawa’s research project had three objectives. The first was to monitor the incidence and severity of stripe rust in Alberta in winter and spring wheat. The second was to develop resistant cultivars in the classes of wheat grown in Alberta. The final goal was to determine an economic threshold for fungicide application to control stripe rust.

Three years of disease surveys confirmed that stripe rust is reaching new places in Alberta, although the degree of infection is often moderate. This work has given researchers an accurate sense of where in Alberta it’s present and how bad it gets.

New tools to combat stripe rust emerge

While wheat varieties with some degree of stripe rust resistance are currently available, Randhawa maintains that this defense must continue to evolve.

“Genes get defeated over time as diseases adapt,” he explains. “We need to keep looking for new genes and incorporating these into new varieties to maintain a good level of resistance.”

As a result of this research, involving Randhawa and his collaborator Dean Spaner of the University of Alberta, eight new cultivars in three wheat classes with improved stripe rust resistance have been registered.

He also sees fungicides, judiciously used, as part of an integrated approach to manage stripe rust. The project included an economic analysis of when it pays to spray. In Randhawa’s view, if a significant outbreak can be identified early, a fungicide application can be a sound investment for growers.

As a disease threat affecting a vitally important crop in Western Canada, stripe rust in wheat has spread and changed in recent years. Fortunately, thanks to the integrated approach researched and advanced by Harpinder Randhawa, growers and buyers of wheat can remain a step or two ahead.

“We have come a long way since the beginning of this research,” he says. “The survey was a great way to get a true picture of what is happening in the province. We have lots of new sources of resistance we have incorporated and we are closer to the next step of continuing development of the new varieties.”

