



# TheWheatField

THE NEWSLETTER OF THE SASKATCHEWAN WHEAT DEVELOPMENT COMMISSION

APRIL 2022 EDITION

## Wheat levy delivers

### Recent study shows strong returns for western Canadian farmer investments in wheat breeding

by Delaney Seiferling

A good return on investment (ROI) is generally considered to be at least seven percent per year.

So, if you had the option to invest in something that provided returns of more than four times that, would you consider that a good deal?

That is the question now posed to western Canadian wheat farmers, who each year invest in the future of their farms by paying check-off fees to their provincial wheat commissions in Saskatchewan, Alberta and Manitoba.

Last year, those three wheat commissions, who are the members of the Canadian Wheat Research Coalition (CWRC), along with the Western Grains Research Foundation and the Saskatchewan Winter Cereals Development Commission, began working together on a study to quantify the benefits of wheat breeding investments in Western Canada in the last 27 years.

The study, led by well-known agricultural economics researcher, Dr. Richard Gray of the University of Saskatchewan, looked at the history of western Canadian investments in varietal research and development to determine the measurable gains from these investments in relation to farmers' and public investments.

The most notable takeaway from the study, says Dr. Gray, was conclusive data showing that for every \$1 of farmer investments in wheat breeding in the last 27 years, farmers have received \$32.60 in benefits (even after accounting for the time value of money). These investments may come in the form of provincial levies or funding from the Western Grains Research Foundation.

This proves just how strong an investment wheat breeding is for farmers, Dr. Gray says.

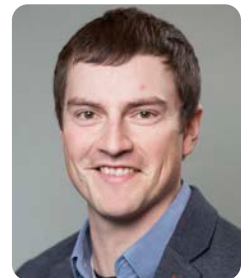
"I would challenge them to find any other investment on their farm as close to that rate of return."

The final study also showed a benefit cost ratio for the total investment in varietal development (combining producer and taxpayer investment) of almost 35:1.

Using another method to measure this, the internal rate of return for farmer investments in varietal development is also extremely high relative to most investments at 33.1 percent. To put this in perspective, this is equivalent to having a bank saving account that earns 33.1 percent interest or nearly doubles in value every two years.

Farmer directors from the western Canadian wheat commissions say this report provides valuable insight into their past investments.

**"This report highlights the incredible success of Canada's wheat breeding programs over the past few decades,"** says Jake Leguee, Vice-Chair of Sask Wheat. **"This is a tremendous rate of return."**



"It's important to revisit the economics of farmer investment in breeding efforts," says Fred Greig, Chair of Manitoba Crop Alliance. "Current information will allow CWRC and wheat commissions the ability to affirm our investment strategy and/or adjust it to better utilize farmers' hard-earned dollars. We often quote the multiplication effect from previous studies, but new information will certainly give our farmers more confidence in our investments on their behalf."

This report also provides the western Canadian wheat commissions with guidance for future investment strategies, says Jason Lenz, Alberta Wheat Commission Vice-Chair.

"This study clearly shows that continuing to enhance our wheat breeding capacity and maintaining funding relationships will be key to ensuring the continued success of farmer investments in varietal development into the future."

*continued on page 5*

in this issue	Chair's report . . . . .	2
	Executive Director's report . . . . .	3
	2022 Wheat Midge outlook . . . . .	4
	Scholarship and award recipients . . . . .	6
	Stacking the odds . . . . .	7

## CHAIR'S REPORT

# Sask Wheat resources assist producers with agronomy and marketing challenges



I hope that 2022 will bring Saskatchewan's grain farmers some relief and allow them to experience some optimism after a very challenging couple of years. We've been through a lot, from the weather and the pandemic to ongoing policy and trade issues that impact wheat and other crops. Some positive news would be welcome.

We had a productive Annual General Meeting in early January, where we installed two new directors, Rob Stone and Scott Hepworth, and passed two resolutions. The resolution that is calling for Sask Wheat and the Saskatchewan Winter Cereals Development Commission to explore options for amalgamation is written about later in the newsletter. I encourage all wheat and winter cereals producers to participate in the engagement process, which is on right now.

We planned to hold our Think Wheat meetings both in-person and online this year, but we decided to cancel the in-person aspect due to the COVID-19 pandemic. We hope that you will be able to join our webinars, as we will be bringing you excellent information on timely topics from experts from across North America.

We have already had three Think Wheat webinars, including one from Josh Linville of StoneX, who talked about the supply and demand of the fertilizer market and what is influencing the prices of fertilizer. His webinar was well attended and we are still receiving requests for the video and slides from it. Keep an eye on our website and our Twitter feed for upcoming dates and topics.

A major issue that came up last October that is still fresh on the minds of many is herbicide carryover. Typically, we have enough precipitation to break down herbicides in the soil so they are not present in the spring. Due to the lack of rainfall and high temperatures across much of the province, herbicide carryover poses a higher risk this year, especially to more sensitive crops such as durum.

Sask Wheat's Agronomy Extension Specialist, Haley Tetreault, and her counterparts from SaskCanola and the Saskatchewan Pulse Growers collaborated to produce a document that explains the problem of herbicide carryover specific to different products, soil zones, moisture parameters, and crops. This is an excellent document that I encourage all producers to consult prior to seeding. The same three specialists produced a joint podcast on the issue, interviewing Clark Brenzil, the Provincial Specialist in Weed Control with the Saskatchewan Ministry of Agriculture. Clark also delivered a Think Wheat webinar on the topic for us in early February. The document, podcast, and recording of the webinar can be found under the agronomy tab on the Sask Wheat website.

The invasion of Ukraine by Russia has pushed the price of wheat up, and this has brought a lot of attention from the media, who think this may bring a windfall for farmers. While some producers will be able to benefit from this situation if prices hold steady and the weather cooperates, for most wheat producers, profit margins will remain tight, putting the focus on growing varieties with improved genetics and implementing more economical and efficient agronomic practices. Unfortunately, the prices of fertilizer, fuel, and crop insurance premiums have increased as well, and timely delivery of inputs such as fertilizer and crop protection products remains a concern due to supply chain issues. The CP rail work stoppage in mid-March further added to these concerns, but thankfully both sides were able to come to a resolution quickly. Hopefully, our supply chains can recover quickly from the stoppage.

From the Board of Directors and staff of Sask Wheat, I would like to wish all of you the best as we prepare for a new growing season.

*Brett Halstead, Chair*



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## EXECUTIVE DIRECTOR'S REPORT:

# Market volatility and transportation challenges face producers ahead of 2022 growing season



I am excited to have been selected to replace Harvey Brooks as the Executive Director at Sask Wheat, following his retirement. I want to express my thanks to the Board of Directors for this exciting opportunity. I have a lot of work ahead of me, but thankfully I have a very engaged group of Directors supporting me and a tremendously talented team in the office. I will certainly continue the direction the Board has laid out for the organization.

We are known as leaders within the agriculture industry and for being responsible stewards of producer dollars and we will work to ensure that Sask Wheat continues to meet the evolving needs of Saskatchewan wheat producers. Much of this is possible because of the depth of experience and strong leadership which was provided under Harvey's watch as General Manager for the past eight years. With that being said, I am pleased to provide my first Executive Director's Report.

Sask Wheat's AGM was held virtually in January. Hopefully next year we can meet in-person again. Two resolutions were brought forward and passed at the AGM. One resolution called on Sask Wheat to advocate for fair grain contract terms to protect producers. Sask Wheat understands the very difficult situation many farmers faced this past year with production short falls and filling forward contracts. Sask Wheat is also aware that grain contract terms and clauses have been a major concern for farmers this year. Sask Wheat, along with SaskBarley, SaskCanola, SaskFlax, SaskOats, Sask Pulse Growers, and the Agricultural Producers Association of Saskatchewan (APAS) have hired a consultant to complete a review of grain contracts and study options to bring more balance into contracts from a farmer perspective. The results of the study will be shared with farmers once it is available, so watch our website, e-news, and Twitter for updates.

As expected, exports to date of wheat and durum are down considerably year-over-year. Canadian Grain Commission export data as of March 6, 2022, show 7.1 million metric tonnes of wheat (excluding durum) have been exported, down 40 percent from last year. For durum, 1.5 million metric tonnes have been exported, a 58 percent drop from last year.

Although there is a significantly smaller crop to move this year, railways have been struggling to fill shipper demand throughout the winter. The devastating floods and mudslides in BC in November 2021 understandably impacted performance; however, after getting the lines back up and running quickly, this winter saw the worst stretch of performance by the railways in the last five years. Order fulfillment numbers from the Ag Transport Coalition and vessel line ups at the West Coast indicate there is still much to be done to improve the resiliency of our grain handling and transportation system. Although railway performance has started to improve, the recent work stoppage at CP threatened to seriously disrupt the grain handling and transportation system again. Sask Wheat was pleased to see both sides come to an agreement quickly through binding arbitration to ensure movement of grain and inputs such as fertilizer will continue heading into seeding.

Sask Wheat continues to invest in research to maximize direct financial benefit to Saskatchewan producers through yield gains, improved quality characteristics and agronomic efficiencies. Understanding the Return on Investment (ROI) for farmers' levy dollars that are invested in research and development is vital to show farmers the benefits they are receiving from supporting Sask Wheat. In 2021, the Canadian Wheat Research Coalition, made up of Sask Wheat, Alberta Wheat Commission and the Manitoba Crop Alliance, along with the Saskatchewan Winter Cereals Development Commission, and the Western Grains Research Foundation began working with Dr. Richard Gray at the University of Saskatchewan to put together updated ROI figures for investments in wheat varietal development. Further detail on that work is provided later in the newsletter.

Recently, Sask Wheat announced commitments of \$3.34 million to 33 research projects funded under the Saskatchewan Agriculture Development Fund (ADF). The approved projects include a study identifying traits linked to drought tolerance in wheat, research into a screening method to test and assess bacterial leaf streak in Canadian wheat germplasm, and an investigation into a new source of resistance to Fusarium Head Blight. Since 2014, Sask Wheat has committed over \$16.24 million to ADF projects.

By investing levy dollars in research and development work that benefits Saskatchewan wheat producers, Sask Wheat is able to participate in the Scientific Research and Experimental Development (SR&ED) Program which gives registered producers access to investment tax credits. Sask Wheat's SR&ED credits have reached record levels for 2020-21 and I encourage all farmers to check out the program and discuss it with your accountant.

*Blair Goldade, Executive Director*

## Sask Wheat welcomes our newest staff member

*Constance Chiremba joined the Sask Wheat team last fall as the Research Program Manager.*



Prior to joining Sask Wheat, Constance was a Program Manager with the Saskatchewan Pulse Growers (SPG), where she was responsible for managing the National Pulse Science Cluster program's research investments in genetic improvement, agronomic best practices, end-use processing and health outcomes. Constance also had responsibility for SPG's investments in pulse processing and health research projects. She brings experience in managing collaborative research agreements and strategic relationships with research and industry partners.

Constance holds a PhD (2012) in Food Sciences, specializing in Cereal Science and Technology. She has held Post-Doctoral positions at the University of Saskatchewan and has ten years of experience as a research scientist with the Agricultural Research Council in South Africa.

# 2022 wheat midge outlook

There may be fewer wheat midge flying around fields this spring. According to the recently released annual forecast maps, there is a decreased risk of the pest that is known to cause yield and quality losses.

“The 2022 map is mostly green, which indicates midge levels of less than 600 per square metre. That’s good news for farmers,” says Dr. Tyler Wist, research scientist of field crop entomology with Agriculture and Agri-Food Canada in Saskatoon. Midge damage is still possible at this level, but the risk is considerably reduced.

In past years, red pockets dotted the forecast maps, flagging areas of more than 1,800 midge per square metre, the most threatening level. In this year’s map, only an area in the north-central region is shaded yellow and orange, which warns of the potential for increased risk.

While the provincial maps are a good indicator for growers and agronomists of what’s to come, Mother Nature has the final say. Moisture—at least 25 mm of accumulative spring rainfall—ultimately determines the timing and severity of a midge infestation.

## Keep scouting

Wist says that although the forecast for 2022 ‘looks rosy’ for growers, he clarifies that doesn’t mean they can forget about the pest. Wheat producers should assess risk based on their own field situation.

“The forecast maps are based on somebody’s field in your neighborhood – it’s not based on your individual field. If you’ve got low pockets in your fields, you might have a wheat midge problem that you don’t know about unless you go out and look for it. It’s important to keep scouting.”

Growers should plan to inspect fields for midge regularly as wheat heads emerge in late June and early July. Female midge lay eggs on the developing wheat heads. They are most active on warm, calm evenings and only live for four to five days, which makes scouting timing critical.

## Getting a complete picture

Forecast maps are put together annually based on data from soil core surveys conducted in the fall. Samples are taken in wheat stubble and then analyzed back in the lab to determine the density of overwintering wheat midge cocoons. But now they’re just one piece of the puzzle for understanding midge populations.

A new annual initiative is helping to “ground truth” the forecast maps. Midge Busters is an in-season monitoring network developed by Wist and SeCan. It involves volunteers across the Prairies (SeCan members and staff as well as independent agronomists) using pheromone traps to count and report midge activity in real-time during the growing season.

Wist is currently comparing the forecast maps with the Midge Busters reports. Preliminary results show that some of the hot spots on the 2021 maps did not lead to the expected midge pressure. Taking a closer look at weather data in these areas

reinforces the role of moisture in midge infestations – there simply wasn’t enough to activate midge out of the ground.

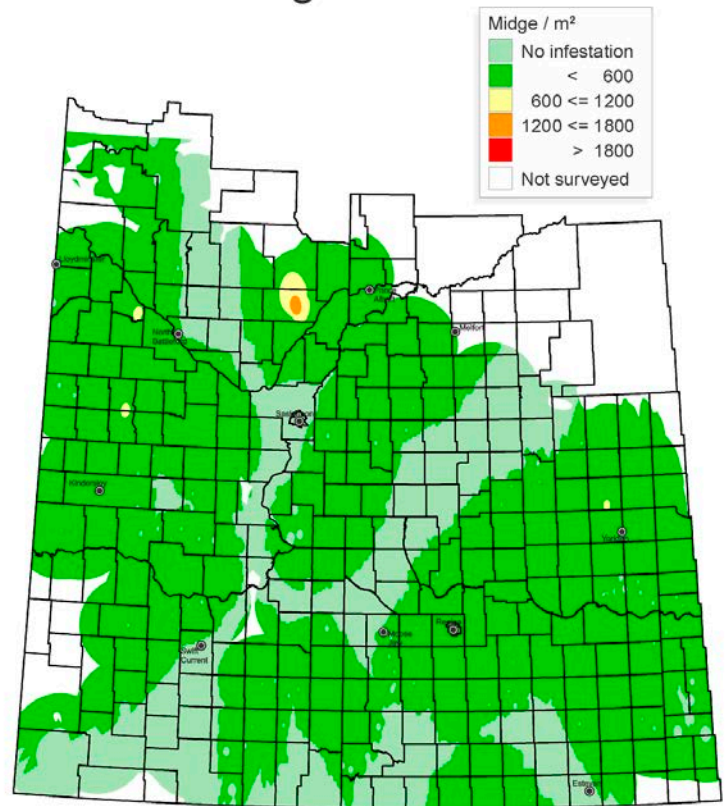
## More savings with midge tolerant varieties

While some growers look to forecasting to help manage wheat midge, others plan to plant midge tolerant wheat varieties regardless. These growers value the peace of mind and savings per acre in both time and money by not having to spray for the pest.

In 2010, research showed that growers saved \$36 per acre when planting Midge Tolerant Wheat. Todd Hyra, SeCan Business Manager Western Canada, recently crunched the numbers based on 2021 data. “Using the same threshold damage of 15%, we calculated new savings to reflect current yield averages and wheat prices. Growers could now save \$94.50 per acre when they use a Midge Tolerant Wheat variety,” he says. (This calculation is 15% x 70 bushels per acre x \$9 per bushel).

For Midge Tolerant Wheat growers who want to continue to realize these savings, following proper stewardship protocols is necessary to keep the technology viable for the future. This means limiting the use of farm-saved seed to one generation past Certified. This practice maintains the interspersed refuge and prevents the build-up of a resistant midge population. Midge Tolerant Wheat also plays a role in reducing the overall midge population, which helps to keep the forecast maps green.

## Wheat Midge Forecast 2022



## About the report

What makes the 32.6:1 rate of return number even more impressive is that it only accounts for gains that come from genetic yield improvements and not improvements in agronomic practices over the same period, Dr. Gray says.

“This is a conservative estimate.”

But if these less tangible benefits were included, the estimated rate of return would be even higher, Gray says.

“Our measure is conservative because we don’t include many other potential benefits. It provides a very defensible estimate because we can measure it accurately.”

Measuring for the benefits of yields alone is also an easier sell for farmers, he says.

“Wheat yields are something that everybody sees,” says Gray. “They understand that the new varieties are better than the older varieties, yielding better, and yields are not as dependent on environmental conditions.”

Another important note of the final ROI numbers is that they are based on the returns being cumulative, says Gray.

This means that, if wheat yields are going up almost one percent annually, after five years the yield increase would be five percent.

The final report shows that the producer-funded investment costs, at less than half-a-percent of gross sales, were dwarfed by the yield benefits, which after a ten-year delay accumulate about one percent of gross sales per year between 2004 and 2020.

This is also why previous studies had lower rates of returns, Dr. Gray says.

“They didn’t have sufficient time to capture the benefits from the research. If it takes 10 years to get something out of the pipeline, after which you’re accumulating gains, you need many years of accumulation to show the size of that stream.”

The ten-year lag also means that for the next period of breeding, 2022-2029, even if producer funding ended, yields would continue to increase for another decade due to the work that has already been done and the varieties already in the breeding pipeline.

## WESTERN CANADIAN WHEAT BREEDING 1994 to 2020

46%

The portion of varietal R&D that has been funded by producers, through breeding agreements

The portion of varietal R&D that has come from public dollar investment

54%

\$370.6M

Taxpayer investments in developing new Western Canadian wheat varieties

Total present value of resulting varietal improvements

\$21.4B

32.6:1

Rate of return for farmers investment in wheat breeding

Rate of return for farmers for total investment in wheat breeding

35:1

\$9.96B

Present value of benefits generated from producer-funded investments

Increase in gross value of wheat production

\$13B

\$11.9B

Benefits occurring in Canada from increase in wheat production

Alberta Wheat  
COMMISSION

Sask Wheat  
DEVELOPMENT COMMISSION

MANITOBA  
CRISP  
ALLIANCE

CWRC  
Canadian Wheat Research Council

SASKATCHEWAN  
Winter  
Cereals  
DEVELOPMENT  
COMMISSION

WGRF



Former Sask Wheat General Manager Harvey Brooks (left) accepts a parting gift from Board Chair Brett Halstead. The gift is a print of a photo by photographer George Clayton. Follow him on Twitter at @gwclayton or go to his website: [www.georgeclaytonphotography.com](http://www.georgeclaytonphotography.com).

# Sask Wheat announces 2021-2022 scholarship and award recipients

Six undergraduate students and six graduate students from the University of Saskatchewan's (USask) College of Agriculture and Bioresources received a Sask Wheat scholarship or award in the 2021-2022 academic year. The students received a combined \$165,000 in awards from Sask Wheat.

Enhancing the capacity of wheat breeding and research is a focus of the Board of Directors of Sask Wheat. From 2015 to 2019, Sask Wheat provided \$10,000 annually in undergraduate awards and scholarships and \$100,000 annually in graduate awards. In 2020, the Board of Directors increased those amounts to \$15,000 in undergraduate awards and scholarships and \$150,000 in graduate scholarships.

## Undergraduate Awards

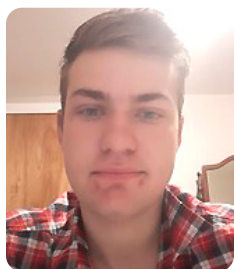
The following students selected to receive a *Saskatchewan Wheat Development Commission Essay Award* were:



**Farren Moss, 3rd Year**  
(Bassano, AB)



**Kinga Nolan, 4th Year**  
(Calgary, AB)

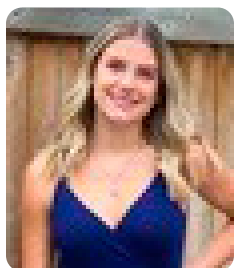


**John Robertson, 3rd Year**  
(Shipman, SK)



**Julie Sharp, 2nd Year**  
(Lacombe, AB)

As well, the recipients of the *Saskatchewan Wheat Development Commission Scholarships* were:



**Johanna Wiebe, 3rd Year**  
(Rosetown, SK)



**Kate Andres, 2nd Year**  
(Hepburn, SK)

## Graduate Awards

The following students received a *Saskatchewan Wheat Development Commission Graduate Scholarship*:

### Kathryn Aldridge (M.Sc. candidate)

Kelfield, SK

\$20,000 scholarship

*Thesis topic:* Interaction of Trifludimoxazin + Saflufenacil and Pyroxasulfone for effective residual weed control

Supervisor: Dr. Steve Shirtliffe



### Lampros-Nikolaos Maros (Ph.D. candidate)

Sourpi, Greece

\$30,000 scholarship (renewed)

*Thesis topic:* Valuation of productivity benefits regarding the international wheat germplasm flows into the Canadian sector and the role of international research centres

Supervisor: Dr. Richard Gray



### Amanda Mitchell (M.Sc. candidate)

Bracken, SK

\$20,000 scholarship

*Thesis topic:* Understanding microbial contributions to soil carbon sequestration in Saskatchewan croplands

Supervisor: Dr. Bobbi Helgason



### Berenice Romero (Ph.D. candidate)

Ramos Mejía, Buenos Aires, Argentina

\$30,000 scholarship

*Thesis topic:* The role of insect feeding and plant defense responses in aster yellows disease epidemiology

Supervisor: Dr. Sean Prager



### Dylan Sjolie (M.Sc. candidate)

Edmonton, AB

\$20,000 scholarship (renewed)

*Thesis topic:* Investigating population dynamics of the wheat stem sawfly (*Cephus cinctus*) (Hymenoptera: Cephidae) in Canadian agroecosystems

Supervisor: Dr. Christian Willenborg



### Blake Weiseth (Ph.D. candidate)

Shaunavon, SK

\$30,000 scholarship

*Thesis topic:* Impact of fertilizer and cropping management practices on phosphorus and nitrogen use efficiency and losses in run-off water in variable topographies of Saskatchewan

Supervisor: Dr. Jeff Schoenau



The objectives of the Sask Wheat undergraduate awards are to provide student assistance and to encourage students to learn about the production of wheat in Saskatchewan and its importance to the agriculture sector and provincial economy.

The Sask Wheat graduate scholarships have helped the USask's Crop Development Centre (CDC) support master's and Ph.D. graduate students, strengthening the CDC's wheat research and development program while training the next generation of researchers and wheat breeders.

# Stacking the odds

## Combining different types of genes to build consistent rust resistance

by Michelle Boulton

**Project Title:** Characterization of multiple rust resistance genes to design an optimal deployment strategy

**Lead Researcher:** Dr. Wentao Zhang

**Organization:** National Research Council

**Sask Wheat Funding Amount:** \$117,875

**Funding Partner:** Saskatchewan Ministry of Agriculture – Agriculture Development Fund (ADF)

Wheat breeders have traditionally relied on seedling resistance genes (R genes) to protect against rust, but rust easily adapts to overcome that resistance. Wentao Zhang, a research officer with National Research Council in Saskatoon, and his collaborators set out to find a more robust alternative.

The three rust diseases (stem, leaf, and stripe) have long been problems for Canadian wheat producers. Historically, stem and leaf rust have caused major crop losses (and they still pose serious threats), but stripe rust has emerged as one of the most damaging wheat diseases in Canada.

These pathogens account for three of the top five diseases targeted by Canadian wheat breeders. With funding from Sask Wheat, Zhang and his team set out to characterize genetic rust resistance to make it easier for wheat breeders to target resistance genes.

R genes are effective at all plant growth stages and can provide very effective rust resistance—but it doesn't last. "There is a very strong relationship between the actual rust race and the resistance in the wheat," explains Kerry Boyle, a technical officer who works with Zhang. "So, an R gene is very specific for one type of rust race and resistance is usually very strong." That resistance fades when rust races mutate.

"Adult plant resistance genes (or APRs) work in a very different manner," says Boyle. "APRs typically have limited resistance and it doesn't have an effect until the plants are mature. But their resistance is nonspecific, so APRs have a small resistance against all of the different types of rust."

Zhang wondered if there might be strength in numbers. He set out to explore the potential of pyramiding (or stacking) multiple APRs along with two or three race-specific R genes into a single genotype. The first hurdle was learning more about the APRs.

"We wanted to know what pairs, or what groups, would work better than others," he says. "For example, A+B might work better than A+C. But when you have hundreds of genes, how can you quickly find out which combinations would be the best?"

Determining the most effective combinations of multiple rust resistant genes from the pool of more than 200 APR genes was a daunting task. "Trial and error would take a long time—it would be impossible," he says. "So, we came up with a more direct approach that can help easily identify the kind of stacking or pyramid that can produce durable results."

Zhang began by characterizing the major APRs and specific R genes derived from a Parula/Thatcher cross. Parula is a variety developed by the International Maize and Wheat Improvement Center (CIMMYT) that has durable resistance to multiple rust types. Thatcher is an important Canadian wheat cultivar believed to have a complex stem rust gene combination.

He knew these lines showed resistance in the field, so Zhang used quantitative trait loci (QTL) mapping to reveal which genes were the most effective and what combinations of APR and R genes would provide the best resistance.

"QTL mapping is how we find some of the more minor resistance genes on the genome," explains Boyle. "It can give researchers a picture of which regions of the plant genome contribute the most to resistance and how the genes interact."

Zhang and his team identified a multi-APR cassette (pyramid) that can reliably be used to produce durable resistance to all three types of rust. Because of the way the APR genes work, there is not a strong need for the rust to evolve and overcome that resistance. The APR genes they have included in the cassette have been stable for decades. They also discovered a small number of R genes that had not been reported before.

"We are building information breeders can rely on," says Zhang. "Rust can evolve very quickly, but if they have APRs, they will know the resistance can be durable and they will have very strong resistance in the field."

The relatively small number of genes in the cassette will make it easier for wheat breeders to target resistance genes. "Breeders can skip some of the steps in their breeding program if they know this package of resistance genes is present," says Boyle.



# WHEAT PROFIT

PODCAST



Wheat Profit provides Saskatchewan wheat producers with resources and information to increase profitability and sustainability on their farms. We interview experts in the field on current production issues and keep producers updated on the latest wheat research.

The latest episodes include:



Herbicide Carryover Risks & Considerations with Clark Brenzil



Managing Herbicide Shortages with Eric Johnson and Tom Wolf



2022 Soil Moisture Outlook With Les Henry

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