# the Barley Bin

FALL/WINTER 2021 MAGAZINE VOL. 1

# WHAT'S YOUR ROI ON BARLEY CHECK-OFF?

We commissioned a study to find out

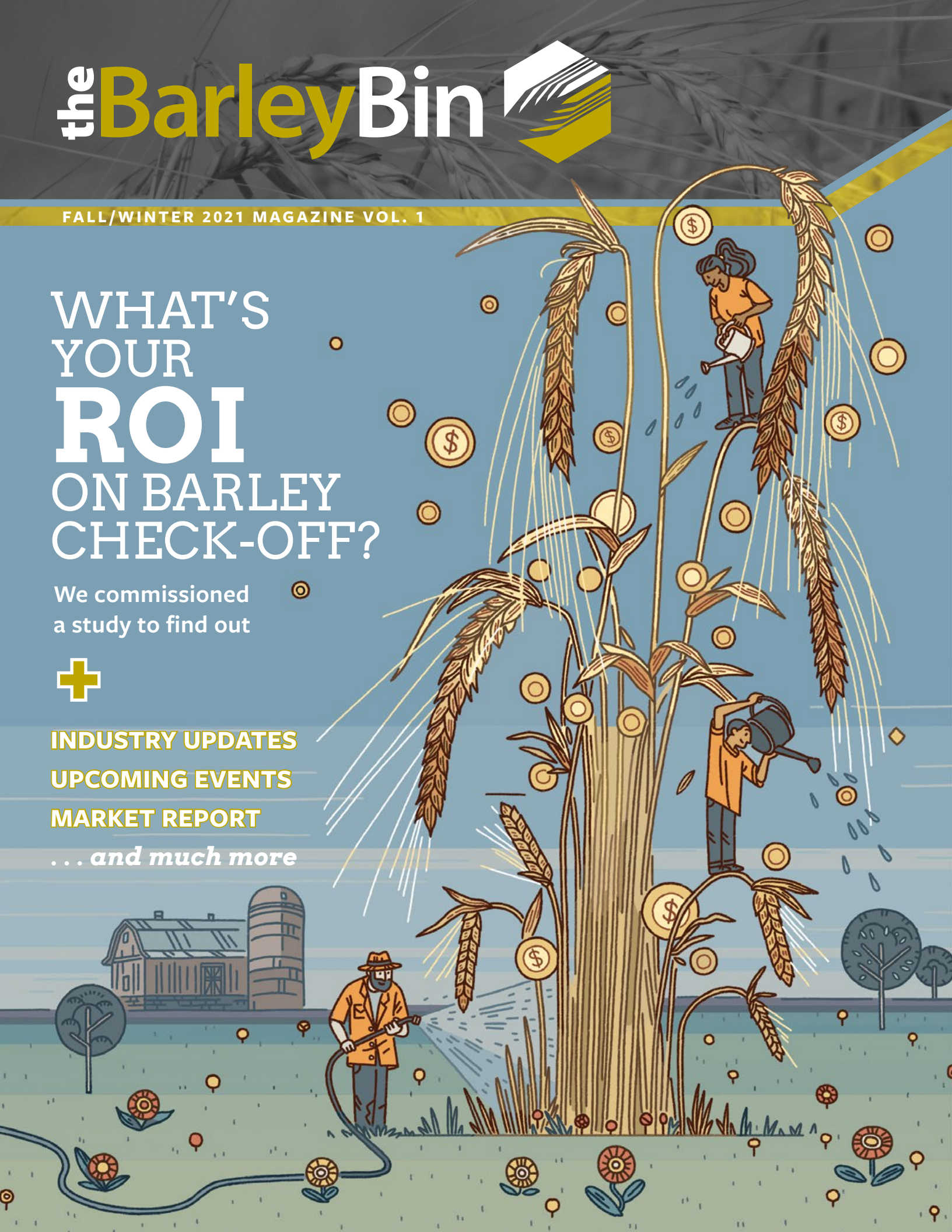
+

**INDUSTRY UPDATES**

**UPCOMING EVENTS**

**MARKET REPORT**

***. . . and much more***





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the BarleyBin

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# BETTER THINGS TO COME FOR OUR INDUSTRY

I hope you all had a safe harvest.

Although this year was exceptionally challenging for many of us in the ag world, including on my own farm, there are few highlights that SaskBarley has been working on that I'm happy to share with you.

The drought this past year has created new opportunities for our industry to come together to address some of our short-term, and longer-term challenges.

In light of the challenges farmers are facing due to the severe drought, SaskBarley joined with several other Saskatchewan crop commissions to request that the members of the Western Grain Elevator Association (WGEA) eliminate administrative fees on contracts for 2021 without rolling these fees into arbitrary replacement costs. We realize there are more issues that need to be addressed in regards to grain contracts but in a year like 2021, every small piece counts. We have been in proactive conversations with the provincial government on this issue as well.

SaskBarley, in addition to a number of other groups, continues to advocate for export sales reporting. This is a key issue for Saskatchewan farmers, as demonstrated by the five resolutions

*"We have continued to ramp up our focus on, and investments in, research and development projects that will benefit our industry."*

passed at separate producer commission AGMs this year in support of more transparency. Farmers need timely marketing information now more than ever, given all the uncontrollable events affecting grain markets. Farmers, who carry the risk, are severely impacted by this lack of transparency. We will continue to advocate on this issue through all available channels. This was all highlighted in our submission on the review of the Canada Grain Act.

In the last two years, our Board continues its primary focus on delivering value to levy payers through research and market development activities. We have continued to ramp up our focus on, and investments in, research and development projects that will benefit our industry. I think these investments in our future are especially important as we are uncertain about what federal investment in ag research will look like going forward. Last year we put out our own call for barley research proposals, which resulted in us investing $1 million in new research with direct ties to benefitting Saskatchewan farmers. We will start to see the results of this research in coming years and we will also continue to grow our investments in this area exponentially in the years to come. Read more about these investments on Page 11.

We have also seen some progress this year in the area of expediting acceptance of new malt varieties within our industry. Our organization has been a catalyst for these changes for some time, pushing change through our involvement with the Canadian Malting Barley Technical Centre (we sit on the board and are a major financial contributor) and our involvement with the Prairie Recommending Committee for Oats and Barley and the Technical Committee for the Brewing and Malting Barley Research Institute. We have recently seen new, higher yielding barley varieties with good agronomic characteristics gaining market acceptance. You can read more about this on Page 7.

Finally, I want to end of a positive note. In January of next year, our Board will welcome three new directors: Zenneth Faye of Foam Lake; Cody Glenn of Climax; and Maurice Berry of Carievale. These three bring with them a wealth of experience in the industry and governance, as well as broad geographic representation. The fact that these three candidates are willing to donate their time and skill to our industry means we are doing something right, in my opinion.

Here's hoping for just the right amount of rain next year

**Matt Enns**
*Chair, SaskBarley*

SaskBarley
DEVELOPMENT COMMISSION

# Future Funding for Barley Breeding

What if you found out you're holding an investment that pays out more than $25 for every dollar you put in? It turns out, you are.

**by Leeann Minogue**

The future funding of barley breeding programs in Canada has been in the spotlight following the value creation/capture consultations initiated by Agriculture and Agri-Food Canada in 2018-19.

SaskBarley asked agricultural economist Richard Gray to look at Western Canadian farmers' spending in this area. Gray and his co-researchers, Katarzyna Bolek-Callbeck and Jillian Brown, were asked to find out what kind of return farmers get from levy dollars spent on barley breeding.

This type of research might sound familiar. Richard Gray has spent much of the last decade studying the economics of research. He's developed methods to calculate what share of returns from crop research actually ends up in farmers' hands. Gray uses conservative estimates for his calculations, he says, including "numbers that producers can verify themselves." Gray has done similar work looking at research investments for other crops. However, as barley growers know, barley is a little different, as maltsters and brewers are often slow to adopt new varieties.

## *WHAT'S THE RETURN?*

To estimate farmers' return on investments in barley breeding, Gray and his co-researchers first calculated how much farmers spent on breeding research from 1995 to 2020, through levies paid on barley sales. A levy of $1.06/tonne on Saskatchewan barley doesn't seem like enough to make a difference, but when levies across the prairies are totalled over 25 years, the investment reaches $51.5 million (in 2019 dollars).

Next, they calculated what farmers got back. Farmers' returns from breeding research come mainly from higher yields. Because it takes 10 years to get a new variety from the lab to the field, Gray and his co-researchers looked at varieties released from 2005 to 2019. Then, they forecast these increases out another 10 years, to consider a 25-year period. Based on estimated adoption rates for new varieties, they used these yield increases to calculate the total increase in production. With average and forecast prices, they put a dollar value to these gains. When they multiplied increased production by prices, farmers' gains came in at $1.360 billion over the 25-year period (again, in 2019 dollars).

With a $1.360 billion revenue increase from an investment of $51.5 million, the ratio of farmers' benefits to costs is 26. That is, for every $1 invested, $26 is returned to farmers through increased barley yields.

## *WHY DON'T WE DOUBLE DOWN?*

With an investment paying out returns like this, the question that comes to mind is "why aren't we investing more?" "There are benefits to doing a lot more than we're doing now," Gray says. "It's a little

frustrating." Western Canadian farmers currently spend about one-sixth of one per cent of gross barley revenue in research and breeding. "Farmers could benefit a great deal from investing more," Gray says, "yet here we sit."

For a mental picture, Gray suggests imagining getting every barley producer in Western Canada together. "You'd have to go to an arena," he says.

Then, in the front, imagine every Western Canadian barley breeder. There are five. That's right, five researchers do all of the barley breeding for all , of Western Canada. There are three in Lacombe, Alberta, at the Field Crop Development Centre, one in Saskatoon at the Crop Development Centre (who also works on oats), and one at the Agriculture and Agri-Food Canada (AAFC) facility in Brandon, Manitoba.

## *ARE WE COMPETITIVE?*

The study commissioned by SaskBarley, titled "Barley Breeding in Canada – A Path Forward," also compared Canadian investments in barley breeding with competitors' breeding investments. Australia, they found, spends almost 10 times more than Canada, with funding coming from Australian barley growers. Australian yields are lower than yields in Western Canada, but they are increasing steadily. Over the past 40 years Australia has moved from publicly funded research to research funded primarily by farmer royalties.

In France and Germany, barley breeding funding comes mainly from private companies and so is difficult to assess. Based on the number of breeders in Germany, the authors concluded that Germany spends more than Canada, and Germany has seen some yield increases in recent years. Production in France has remained relatively constant.

Going back to the visual image of Western Canada's five barley breeders, Jason Skotheim, Saskatchewan farmer and outgoing Director of SaskBarley points out that these five scientists are "really hitting above their weight." Under their watch, Western Canadian barley yields continue to increase — and maintain a global reputation as a premium product — while the agronomics of barley keep improving, keeping barley relevant in Saskatchewan crop rotations.

## *HOW DO WE SELL NEW VARIETIES?*

As barley growers know, once malt buyers find a variety they like, they're reluctant to try something new, even when new varieties offer farmers higher yields and better agronomic traits. This complicates investments in barley breeding. Some high-quality varieties are passed over by maltsters and never catch on. Gray considered this problem as part of the research study. He found that if farmers could always grow the top-yielding varieties, the benefit/cost ratio of breeding research could reach as high as 50, approximately doubling current returns on breeding investments.

In this situation, there is a potential danger to releasing too many new varieties. "We don't want a lot of 'me-too's,'" says Jason Skotheim, "where a variety is one or two percent better in a single category. We'd rather have fewer varieties, because then it sends a clear signal to the supply chain." SaskBarley is working in this area, Skotheim says. "We've been doing a lot of market development work to try to get our market to understand that we need higher levels of churn in the varieties we grow."

The rise of craft microbreweries and the "buy local" movement present opportunity in this area. Local buyers for niche markets could provide a market for new, high-yielding varieties that are not accepted by large-scale maltsters.

## *WHAT'S IN THE FUTURE?*

Future public funding for barley breeding research is uncertain. AAFC has sent signals that investment in variety development will be pulled back, and COVID-19 may further impact future government spending. In the fall of 2018, AAFC held a series of public consultations on new "value creation" models, or new ways to fund breeding research. These consultations included barley alongside other cereals, without special consideration for the effects of malt selection. There were no clear results from these consultations.

In this environment, Gray's study concludes that farmers should be confident that their levy payments have resulted in higher profits, and should dedicate more check-off funding to barley breeding programs. Gray says, "The biggest question is, 'Why not do more?'"

SaskBarley recognizes those returns and allocates over 70% of its annual budget to research with a significant portion of those dollars in variety development, with an aim to continue developing exciting and high-yielding barley varieties, Skotheim says.

"The value proposition that research presents to producers is significant," says Jason Skotheim." "Every farmer should be leaving their check-offs with the crop commissions."

**For more information, or to see the full report, visit saskbarley.com.**

# Congratulations to our 2021 scholarship recipients!

Each year, SaskBarley offers scholarships as an investment in promising university students who are carrying out university-level research focused on barley. The scholarship program also encourages and supports new research to benefit Canadian barley.

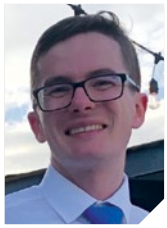
We would like to congratulate Janice Fajardo, Michael Taylor and Anuradha Jayathissa, who received scholarships this fall! See below for more information on their barley research.

**JANICE FAJARDO**
*M.SC. STUDENT AT THE UNIVERSITY OF MANITOBA*

**Finding practical approaches to Fusarium mitigation**

In malting barley, fusarium head blight (FHB) has led to economic impacts due to lowering of grain quality associated with mycotoxin contamination. FHB is caused by several species of Fusarium, with *Fusarium graminearum* as the predominant causal agent. Two relevant aspects of *Fusarium* growth on barley during malting are defensive plant compounds such as phenolic acids, and the presence of other microbial colonizers. The functional modifications that occur to the grain during malting influence the composition of both the phenolic acids that are released, and the microbes in barley.

My work investigates interactions between phenolic acids that are produced by barley, some members of the microbial community that inhabits malting barley, and *Fusarium* in malting. The integrated effects of phenolic acids and the microbial community of barley are poorly understood; thus, one of my goals is to assess these aspects in more detail by evaluating *Fusarium* growth and mycotoxin production during malting, and how these outcomes are impacted by the presence of a competing microbe, the presence of phenolic acids, and the presence of both the microbe and phenolic acids. These studies will provide detailed insights that may form the basis for practical approaches to the mitigation of *Fusarium*.



**MICHAEL TAYLOR**
*M.SC. STUDENT AT THE UNIVERSITY OF SASKATCHEWAN*

**Lodging: the great fall of barley**

The project goal is to get to the root of the lodging problem in barley. This consists of two main investigations. The first is imaging of the barley root system in both 2D and 3D systems. These images then have detailed root trait data extracted and the influence of these traits on lodging is then examined. The other part of the project consists of collecting field data such as stem strength, anchorage failure, imaging stem cross-sections and more, with a similar goal to the root imaging – to find their relationship and influence to lodging.

This project has three main goals, first to assess barley root system architecture in 2D and 3D hydroponic systems. The second goal is to examine both root and stem characteristics in relation to lodging resistance in the field and lastly, which of these traits and systems have the most influence on lodging resistance. The overarching goal of the project is to give barley breeders the tools and potentially even breeding targets to assess lines more easily for lodging resistance.

**ANURADHA JAYATHISSA**
*PHD STUDENT AT THE UNIVERSITY OF MANITOBA*

**Linking malt quality defects with traits of *Fusarium graminearum***

Fusarium head blight (FHB), caused by *Fusarium graminearum*, is a devastating disease of barley resulting in significant losses for the malting and brewing industry. The malting process creates conditions that favour new fungal growth and new production of mycotoxins after harvest, which contributes negative qualities to the finished malt. For my project, the impacts of several strains of *Fusarium* on malt quality will be assessed, as certain *Fusarium* strains possess a range of traits related to malt quality issues.

My goal is to provide an improved understanding of which traits enable *Fusarium species* to succeed within the malt microbiome, thereby negatively impacting malt quality. I will also be investigating *Fusarium* hydrophobins, which are small, secreted proteins produced by the fungus during malting. Hydrophobins are the main inducers of primary beer gushing which can directly influence the beer quality. In this study, I am hoping to explore the variability in *Fusarium* hydrophobins due to amino acid sequence differences among several *Fusarium* strains, and how the relative abilities of these variants to induce beer gushing. We expect that results from this project will lead to improve management of *Fusarium*-related quality issues that plague the malting industry.

CANADIAN MALTING BARLEY TECHNICAL CENTRE

# Acceptance of new Canadian malting barley varieties rising

**by Peter Watts**
*Managing Director*

The uptake of new Canadian malting barley varieties by domestic and international maltsters and brewers continues as end-users test and approve new cultivars for use in their products. Varieties such as CDC Bow (registered in 2015), AAC Connect (2016), and CDC Fraser (2016) are increasingly being selected by Canadian maltsters and grain companies, and approved by brewers in their malt blends. In addition, many international malting and brewing companies have now added these varieties to their accepted list. Still, the process of gaining acceptance can be quite long and arduous as end-users want to ensure the new variety performs in their processes, and does not present any issues in terms of quality, cost, and sensory attributes of the final product. As a result, more work needs to be done to accelerate the process of evaluation and enable the industry to capitalize on the benefits of new varieties as quickly as possible.

The process of gaining acceptance of a new variety starts as soon as a breeder successfully receives a recommendation by the Prairie Recommending Committee for Oats and Barley (PRCOB) for registration with the Canadian Food Inspection Agency, which happens at the Prairie Grain development Committee (PGDC) meeting at the end of February each year.

Typically, a variety is then put up for tender by the breeders, and a seed company will seek the rights to distribute the new line. Assuming this happens quickly, the seed company can take breeder seed in the spring to start the process of seed multiplication.

By the fall, small samples will be available for quality evaluation which is done by organizations like the Canadian Malting Barley Technical Centre (CMBTC) where micro malting trials are conducted and malt quality evaluated and communicated to the value chain.

*Continued on next page*

## Canadian Barley Research Coalition Updates

**Gina Feist,** *Manager*

The Canadian Barley Research Coalition (CBRC) was founded in 2020 as a national not-for-profit organization with a focus on improving profitability and competitiveness for western Canadian barley through long-term research investments. Founding members of the organization are SaskBarley, Alberta Barley Commission and Manitoba Crop Alliance.

To date the CBRC has made investments in the core barley breeding programs at the Crop Development Centre (CDC) and Agriculture and Agri-Food Canada (AAFC) Brandon station for a total of $1.5 million to AAFC and $2.7 million to CDC.

Over the past year, the CBRC partnered with the Brewing and Malting Barley Research Institute (BMBRI) to engage Gina Feist as Manager of the CBRC. CBRC has also been contracted by the Barley Council of Canada to administer the current National Barley Cluster. To assist with this, Shelley Lagasse joined the CBRC on September 1, 2021, and will take over the administration and coordination of the current $10.5 million cluster.

CBRC is also very excited to be leading the development of the next Barley Cluster (CAP 2.0) and has already initiated a call for Letters of Intent from researchers.

For more information visit:
**www.barleyresearch.ca**
**@barley_research**

## Barley Council of Canada Updates

**Adele Buettner**, (*Interim*) *Executive Director*

The Barley Council of Canada (BCC) has undergone some changes within the past few months such as a new location in Saskatoon, with AgriBiz Communications Corporation as the Interim Executive Director. We will continue to work with the entire value chain to ensure a coordinated and efficient effort on issues related to market access and government relations.

For more info:
**www.barleycanada.com**
**@BarleyCanada**

**cmbtc.com** For inquiries please contact the CMBTC by email at **cmbtc@cmbtc.com** or call **204-984-4399.** @MaltAcademy @MaltAcademy

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By year 2, commercial entities such as malting companies will also start to receive samples for evaluation at the lab scale, and by year 3 or 4, seed companies should have sufficient quantities for malting companies to undertake commercial scale production trials.

Canadian malting companies are the generally the first to carry out commercial trials with between 30-400 tonnes of a new variety. This is a critical step to ensure there are no processing issues associated with a new cultivar at a commercial scale before signals are sent to seed growers and producers to scale up production.

Malting companies also work with their brewer customers to trial the new varieties. In addition to this work done by the domestic malting industry, the CMBTC works with customers in export markets to facilitate the evaluation and acceptance of new varieties. This work starts by sharing quality and performance data generated in Canada in the first couple of years after registration, with small samples (e.g. 2-10 kgs) sent to end-use customers for internal testing and evaluation. Once commercial quantities are available, working with grain companies, containers of new varieties are sold and shipped for in situ production trials, typically the final step to gaining commercial acceptance.

In 2019, the Brewing and Malting Barley Research Institute and the Canadian Malting Barley Technical Centre struck a "New Variety Acceptance" committee made up primarily of North American malting and brewing companies to help accelerate the process of new variety acceptance. The committee shares results and experiences with new varieties, and provides estimates of future demand to enable seed companies to better plan for seed scale up and supply to ensure sufficient quantities are available each year. This process also helps the value chain understand which new varieties are performing well, and also identifies any red flags, ultimately accelerating the process of new variety adoption, or a decision to drop a variety if it is not meeting industry requirements.

*The CMBTC works with customers in export markets to facilitate the evaluation and acceptance of new varieties.*

While Canada's malting barley sector has struggled with new variety acceptance over the years, recently a more structured, strategic, proactive approach has been implemented to gain acceptance of new varieties in a reasonable turnover period that allows for a profitable ROI on industry investments in breeding and commercialization. Under an optimal scenario, the industry will capitalize on new genetics in a timely fashion with promising new varieties introduced, tested and scaled up within a 3-4 year window, expediting acceptance by the industry from producers through end users.

# Upcoming Events

### AGRIBITION

*November 22-27, Regina, SK*

We are excited to be sponsoring Canada's best beef show on the continent and the largest livestock show in Canada once again this year. You can see a schedule of events and event details at **agribition.ca.**.

### CMBTC PRODUCER MALT ACADEMY

*1-week Intensive Malting Course — December 6-10, 2021*

A hands-on course designed to give theoretical and practical knowledge of malting technology, the manufacturing process, and of the factors that influence malt quality and its impact on performance.

*Malt Academy Saskatoon, 2-day course — February 2-3, 2022*

More information coming soon on **www.saskbarley.com**.

*3-day Malting Overview Course — February 9-11, 2021*

This course provides an overview of the Canadian malting barley value chain, offering participants theoretical and practical knowledge of malting technology and processing. Students will also gain an understanding of malting barley selection criteria, quality evaluation, malt analysis, specialty malts and brewing, as well as a review of global barley, malt and brewing statistics.

Please contact **slagasse@cmbtc.com** for more information. To register online or view a tentative schedule visit **cmbtc.com**.

### SK CROP ORGANIZATION AGMS

*January 10-11, 2022, Prairieland Park, SK*

Attend the Saskatchewan Crop Organizations annual general meetings this year and get the chance to tune into presentations from market analysts Marlene Boersch of Mercantile Consulting Venture Inc. and Chuck Penner of Leftfield Commodity Research. From international movement and demand to local production numbers, AGM attendees will learn about market demand and outlook for all cereal and pulse crops. For information visit **saskcrops.com**.

### SASKBARLEY ANNUAL GENERAL MEETING 2022

*January 11 at 11:15 AM, Prairieland Park, SK*

**Agenda**

1. Call to Order
2. Approval of Agenda
3. Review and Approve Minutes of the Last Annual General Meeting
4. Business Arising from the Minutes
5. Report from Organization
6. Auditor's Report
7. Appointment of Auditor for 2021/2022
8. Election Results
9. Call for Resolutions
10. New Business
11. Adjournment

**Call for resolutions**

To submit a resolution in advance of the meeting, please email **info@ saskbarley.com** by Tuesday, January 4, 2022. Visit **saskcrops.com** to register.

### LEARN TO LEAD

*March 18 & 19, 2022, Saskatoon, SK*

If you have a passion for farming, and want to better understand the role you can play in helping shape the path of the industry in the future, than this event is for you!

SaskBarley is a proud sponsor of Learn to Lead hosted by SaskCanola, taking place March 18 & 19, 2022 (note date change) in Saskatoon, SK. Learn to Lead is a professional development program to build leadership capacity among farmers and create future leaders for the agriculture sector.

Visit **saskcanola.com** to learn more about the event.

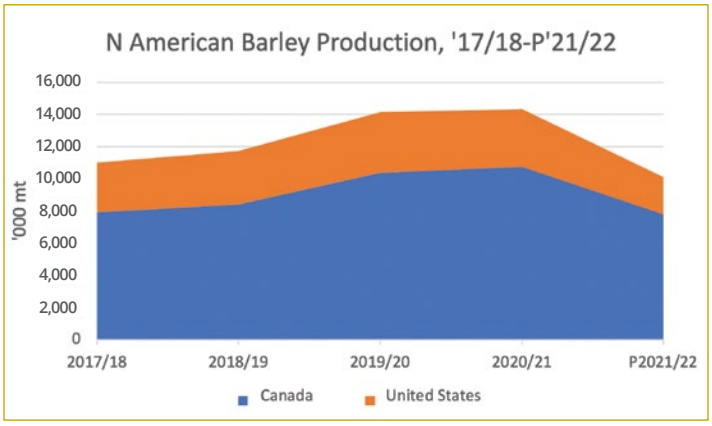
# Canadian barley outlook

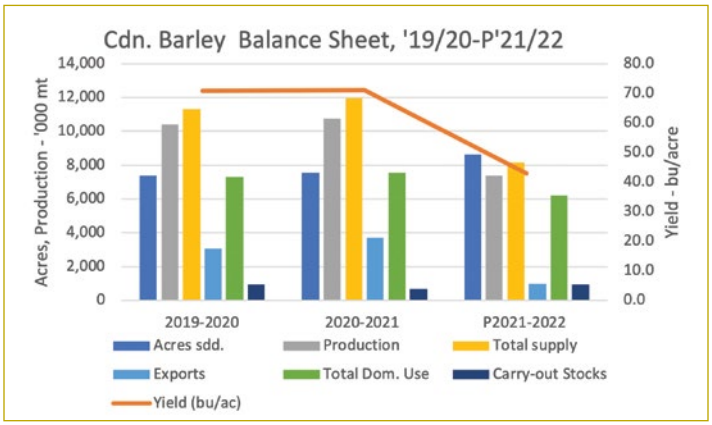
## What to expect when marketing your barley

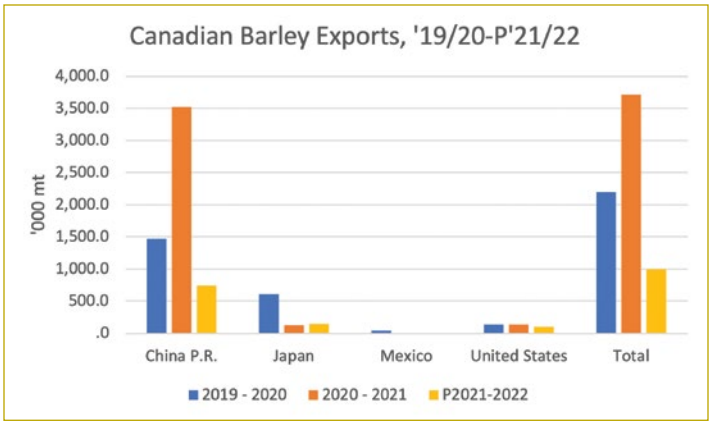
**by Marlene Boersch**
*Mercantile Consulting Venture Inc.*

The role of barley on the Prairies has changed profoundly over the past 50 years. The barley acreage in Western Canada has fallen from a range of 10-14 million (M) acres in the 1970's to 5.7-7.5 M acres 2015 onwards. On the production side, other crops have progressively displaced barley acres by challenging the return per acre comparisons with barley. On the demand side, traditional export markets have held constant or decreased, while feed consumption of barley has declined in favour of corn. For Canadian barley exports, Japan and China are now basically the only major markets, while the Middle East is being supplied by the Black Sea and European producers. Canada is also still locked out of the biggest feed barley market in Saudi Arabia as a political fallout to a tweet from then Minister of Foreign Affairs Chrystia Freeland.

Malt barley usage was also in decline until the emergence of craft and micro-breweries in the United States (U.S.) and Canada started to instill more life into the industry. Craft and micro-breweries use more than double the malt per barrel of beer in their processes, thus driving the demand for malt up. There are now more than 4,000 craft breweries in the U.S. alone.




However, the barley market for the 2021/22 crop will be unusually influenced by the shortfalls of crops produced in the northern U.S. and on the Canadian Prairies. This year's combined North American (Canada and United States) barley production has declined to about 10 M tonnes from 14.3 M tonnes last crop year and compared to the recent four-year average of 12.8 million tonnes.

Specifically, Canadian production of barley fell to 7.3 M tonnes due to drought-reduced yields, and the '21/22 Canadian barley supply was reduced to ~8.1 M tonnes from just under 12 M tonnes last year (-32%). This is leaving North American barley in a deficit position.

Demand for feed barley represents the biggest use segment of barley today, with demand for about 5 M tonnes annually. The tightened supply has been reflected in bids for feed barley in Saskatchewan holding steady from last year, despite expected decreases in exports due to China's corn crop and drought on the Great Plains. Bids have recently ranged from $7.25-8.00/bushel (bu) picked up farm. Bids for feed barley will align with corn values. CBOT Dec corn is trading at US$5.17/bu today, which translates into about C$7.60/bu Alberta, so current bids are roughly in line with corn. However, we anticipate corn values to appreciate to $6.00/bu later into the winter, which should translate into ~$8.50-8.75/bu for feed barley.

Malting barley is the other important demand segment, as it includes domestic demand for malt barley as well the export demand for Japan and China. (Note that Chinese specs. for malt barley are not as tight as to most other destinations). We estimate that Canadian barley exports may be down as low as ~1 M tonnes from 3.7 M tonnes last crop year.

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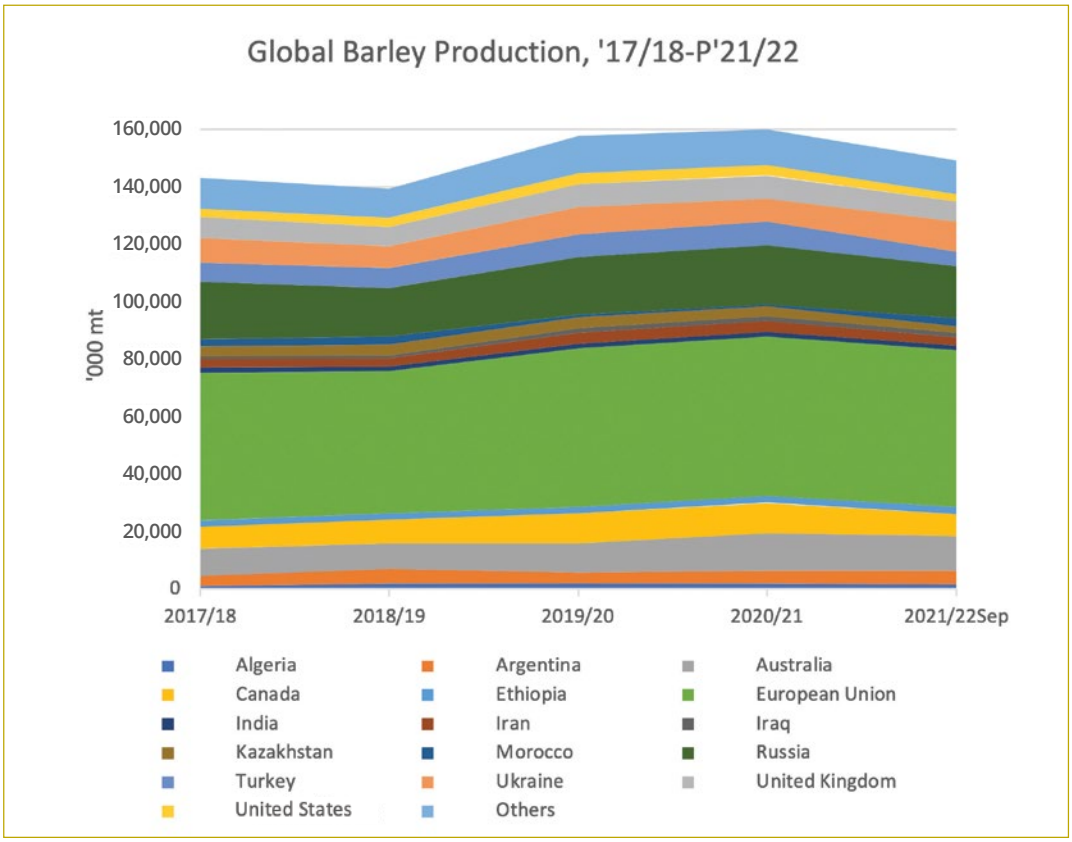
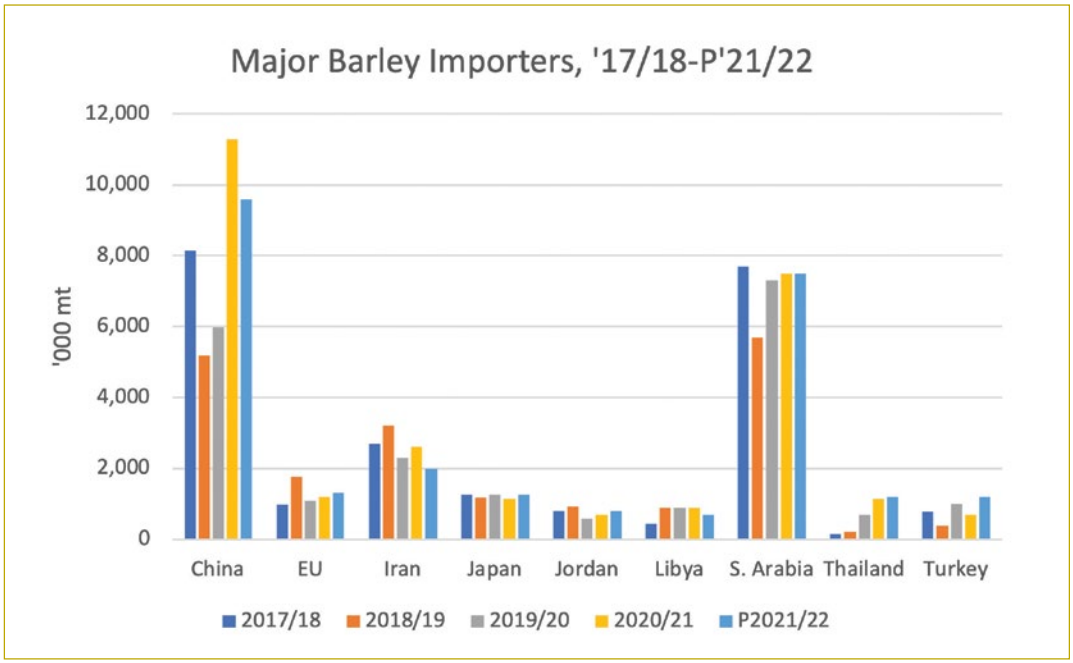
This would be a 73% reduction, with almost all the reduction in exports occurring to China and to the U.S., while maintaining exports to Japan.

There is no question that both Canadian and U.S. maltsters are currently short supplies, and we anticipate maltsters will have to adjust their quality requirements to source sufficient supplies. We expect malt barley to trade at $10/bu, which is good value. We caution that the short is primarily a North American short, and once the North American problem is dealt with, values may fall somewhat, similar to what we have seen in the durum wheat.

We do not expect major imports of malt barley into Canada, except perhaps to Canada Malt for Montréal and Thunder Bay.

We note that '21/22 global barley production at 149 M tonnes is also down by almost 11 M tonnes (-7%) from last year, which will keep global markets tight. Among the major global producers and exporters of barley, the Ukraine with a 10.5 M tonnes production was the only producer with a sizeable increase in production over last year (+2.6 M tonnes). Canada and Kazakhstan were the countries with substantially smaller crops in 2021/22 than initially forecast with a production decline of 38% in each country's forecast between May and September.




Driven primarily by China and Saudi Arabia, demand for barley is expected to remain strong. These two countries account for about half of world trade in barley. Most of the trade is expected to be for feed-quality barley, although China also imports malting-quality barley. Total import demand is estimated at 33.5 M tonnes, compared to 35 M tonnes last crop year. Global ending stocks are expected to drop to 17.4 M tonnes, down 19% from last crop year's 21.4 M tonnes.

# Exciting new research

An overview of all the new projects we funded in the 2020-21 fiscal year

*Fusarium head blight nursery in Brandon, MB, 2021.*

## *BREEDING IMPROVED DON RESISTANT BARLEY VARIETIES; IDENTIFYING NEW TOOLS TO BREED FOR DON RESISTANCE*

Fusarium head blight remains one of the most important diseases of barley. The primary economic consequence of FHB infection of barley is the presence of DON in the grain which can render barley grain unacceptable for malting and brewing (above 0.5 ppm), swine and dairy cattle feed (above 1.0 ppm) or beef cattle feed (above 5.0 ppm). Attempting to minimize FHB infection of a barley crop requires multiple strategies, with the best approach being a combination of agronomic practices and genetic resistance. Within the barley breeding community, breeding for FHB resistance has focused predominantly on resistance to DON accumulation in the grain.

The purpose of this project is to maintain our progress in breeding improved DON resistant barley varieties and to identify new tools to breed for DON resistance. This will be accomplished in three ways:

- Continued evaluation of new barley lines for DON resistance within the AAFC FHB nurseries established across Canada;
- Use of recently developed methods for in-house DON measurement which will ensure that all breeding lines are assessed for DON content in a timely manner;
- To create a genomic selection model for DON resistance that can be used to select better DON resistant barley lines more effectively.

For more information on any of these or other SaskBarley-funded projects, visit saskbarley.com/projects

***Continued on next page***

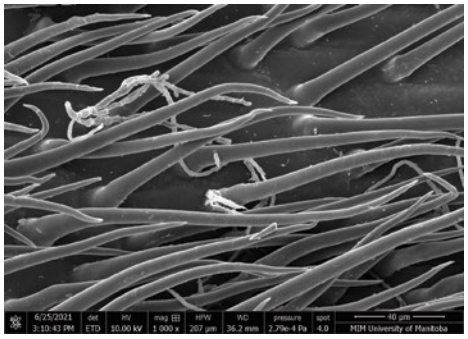

*The CMBTC research team (above) and Fusarium growth in trichomes (below).*

*Cont. from previous page*

Collectively, these activities will help the breeding of improved DON resistant varieties to alleviate the negative financial costs associated with high DON infection on barley and support the production of high-quality barley that western Canada has become known for.

## *IMPROVING DISEASE MANAGEMENT AGAINST BACTERIAL LEAF STREAK IN BARLEY*

Bacterial leaf streak (BLS), also called black chaff when on the spikes, is an emerging disease that could become a major threat to cereal crops in Canada. The disease is caused by the bacterium *Xanthomonas transluscens* that have become more prevalent in the prairie provinces due to favourable conditions. Fungicides do not work with bacteria and resistance levels to the disease in Canadian barley cultivars is unknown. The best way to avoid a BLS outbreak is to use clean seed but an integrated approach is the most sustainable way of managing the disease. The three-year work plan proposes to develop a seed testing protocol to detect the pathogenic bacteria on barley kernels. A rapid and accurate seed testing protocol to identify contaminated seed can aid in evaluating disease risk associated with a seed lot. This technology will have immediate application and will reduce production risks for farmers. A second objective is to establish a BLS disease evaluation method to test plants indoors (greenhouse/growth chambers) that will allow the screening of germplasm for sources of resistance to develop disease resistant commercial cultivars.



Finally, our team also aims to determine the prevalence and virulence of the bacterium strains isolated from barley samples across western Canada. These results will determine the prevalence of the pathogen and the predominant genotype(s) in the region indicating the extent of the problem to pathologists, agronomists, breeders, and farmers as well as other stakeholders of the barley value chain.

*Crop Pathology and Genetics Lab students and staff rating barley stripe rust nursery on UBC Totem Farm.*

## *EXAMINING FUSARIUM GROWTH AND INTERACTIONS WITH BARLEY TRICHOMES UNDER THE HULL*

Improved traits in new barley cultivars are the best route to reducing the damage caused by fusarium head blight (FHB). In this project, we will be exploring whether new targets for improving barley can be found in micro-scale features of barley spikes, such as trichomes or the thickness of the seed coat and the hull. Trichomes are prickle or bump-like projections of plant cells. Trichomes are not currently a deliberate target of selection in barley breeding programs, but they have been suggested to facilitate *Fusarium* infection by promoting the trapping of spores on the plant surface. Thicker seed coats or thicker hulls may also be more difficult for *Fusarium* to penetrate. This project will characterize these features for a wide range of barley varieties, and will indicate whether selection on such micro-scale floral traits could be useful for reducing infection by *Fusarium*.

## *ASSESSING THE EFFECTS OF BLENDING CDC CLEAR HULLESS BARLEY MALT FOR BEER PRODUCTION*

Hulless barley malt offers significantly higher extract yield than malt produced from hulled barley, creating the potential for significant increases in brewing efficiencies and reduced raw material costs for brewers. The absence of hulls may also reduce negative flavour attributes and increase shelf-life stability. Hulless barley has higher test weight than hulled barley leading to potential savings in transportation and storage for maltsters and brewers, and produces less brewers spent grains (BSG) per volume of beer production, with the opportunity to reduce costs associated with disposal of BSGs. However, malting and brewing with hulless barley presents several challenges for both maltsters and brewers. This research project aims to develop optimum malting protocols for hulless barley to realize its full quality potential and to gain a better understanding of the benefits of using hulless malt in a lauter tun during the brewing process. Assessment of the benefits of reducing undesirable sensory attributes associated with barley hull/husk such as astringency linked to polyphenols and potential reductions in haze development to extend colloidal stability will be investigated.

Ultimately, the goal of this project is to enhance the viability and interest in using hulless barley malt in brewing formulations to take advantage of potentially high extract values, opportunities for improved sensory characteristics and shelf-life stability, as well as potential cost savings in malt and spent grain transport and storage.

CDC Clear barley will be used to carry out this study. The results to be generated from this research will promote its utilization and pave the way for varietal uptake of other hulless barley lines currently in development.

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### *WESTERN CANADIAN PROVINCIAL MALTING BARLEY VARIETY FIELD TRIALS*

Barley grain quality and yield potential are by controlled by barley genetics and influenced by agronomic practices (seeding time and rate, application of fertilizers, and pest control) and growing conditions such as soil moisture and fertility, temps, amount and distribution of the rainfalls etc. during growing season. In order to promote growth and utilization of newly registered malting barley varieties, we need to generate representative performance data for each of these newly registered Canadian barley varieties.

The main objectives of this project are: to produce representative barley samples by conducting field trials with new and the control malting barley varieties in mutiple locations on the Prairies in multiple years; to generate comprehensive malting quality data that can be used to promote new Canadian barley varieties domestically and internationally; and to establish a reliable record of agronomy, disease, barley and malt qualtiy for each of the new and emerging Canadian malting barley varieties.

The results will provide maltsters, brewers, grain companies, seed companies, producers, breeders and others who are involved in the Canadian malt barley value chain with an important dataset of annual crop quality by variety and by region, and the performance of new varieties compared with the controls, as well how defined environmental and agronomic conditions affect the grain quality. In addition, this project will provide key quality and performance indicators regarding new varieties to help malting barley buyers and end-users make informed decisions about which varieties meet their needs and the requirements of their customers domestically and internationally.

*Western Canadian Provincial Malting Barley Variety Field Trials at Codette, SK, 2021*

### *ENHANCING BARLEY BREEDING PROGRAMS IN WESTERN CANADA: ESTABLISHING DISEASE NURSERIES AND SELECTION OF GERMPLASM FOR PRE-BREEDING*

FHB is one of the most challenging disease for barley breeders in Saskatchewan and Canada and breeding for FHB resistance is more challenging than other diseases because of large influence of environment on the phenotype. To increase the genetic gain (improvement in performance each year) for FHB resistance breeding, screening of breeder's material at multi-site-years is required and this project will add an additional FHB screening nursery in Vancouver for three public barley breeding programs (CDC-Saskatoon, FCDC-Lacombe, AAFC-Brandon) in western Canada. Warm

*SaskBarley is currently funding*

**44**

*active projects.*

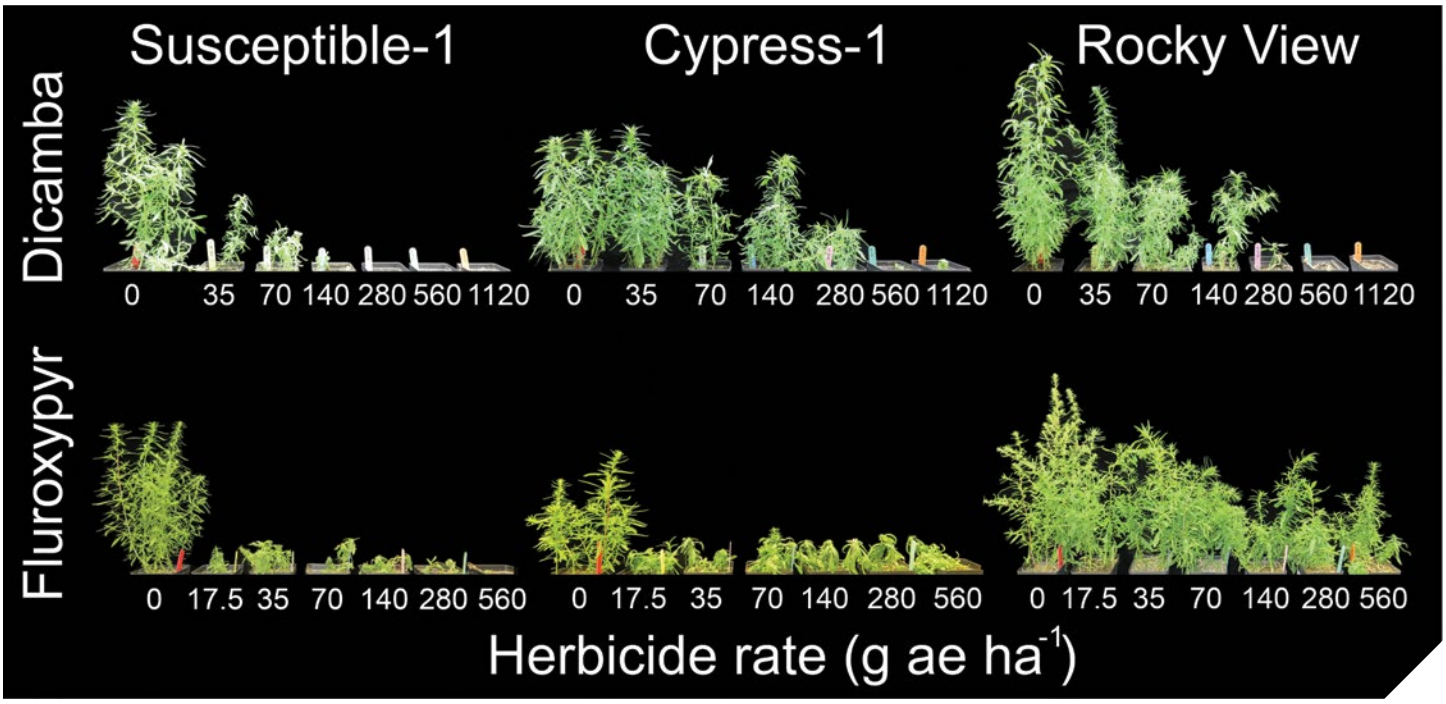


*Figure (above): Response of three kochia populations to multiple rates of dicamba and fluroxypyr. The field rate of dicamba was considered 280 g ae ha-1, while the field rate of fluroxypyr was 140 g ae ha-1. Figure published in Geddes et al. 2021. Herbicide diagnostics reveal multiple patterns of synthetic auxin resistance in kochia (Bassia scoparia). Weed Technology*

*(Left): Pearled barley for studies of enhanced ethanol yield.*

and humid coastal climate of Vancouver is not only good for FHB screening, it is hotspot of stripe rust in Canada which means we can screen breeder's material for FHB and stripe rust at the same time. The overall goal of this research is to strengthen the capacity of barley breeders to help them deliver multi-disease resistant varieties to Saskatchewan and western Canadian growers.

## *TARGETING MYCOTOXIN RESISTANCE TO CONTROL FUSARIUM HEAD BLIGHT*

Fusarium head blight (FHB) is a fungal disease that causes significant economic losses for barley producers. Improving FHB resistance is complex because resistance is influenced by multi-layered plant defenses and by fungal attack on these defenses using secondary metabolites. We recently helped to discover the gramillin secondary metabolite and found that gramillin production is an essential attack strategy for the fungus to cause FHB in barley. Purified gramillin is also toxic to plants and causes watersoaking and cell death within hours of exposure (see image). A survey of Canadian barley varieties showed that gramillin resistance exists in some varieties with moderate FHB resistance. The goal of the current project is to understand gramillin resistance in barley and to enable transfer of gramillin resistance genes into elite barley varieties for the Canadian market. Our team uses a combination of molecular genetics and gene mapping to track gramillin resistance genes in Canadian barley varieities and find the plant defense responses that are targeted by gramillin.

## *IMPROVING BARLEY'S ABIOTIC STRESS TOLERANCE AND QUALITY*

Barley is a significant Canadian crop that has been seeded since 2016 on an average of 6.8 million acres and 2.8 million acres across Canada and Saskatchewan, respectively. This project involves the development of new barley genotypes by screening a diversity of barley germplasm for salinity tolerance and Gamma Aminobutyric acid (GABA) content, including Canadian varieties, breeding lines and landraces/wild barley accessions. This will allow us to understand if GABA plays a role in variation for salinity tolerance and identify possible sources to improve this trait in Canadian barley.

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This project will also explore the capabilities of the CAS9/sgRNA based gene editing technology for manipulating abiotic stress resistance gene targets and thereby building a foundation for transformative approaches to barley improvement. The mitigation of abiotic stress not only would increase barley yield for the producers but also add economic benefits to all stakeholders along the barley value chain.

The objectives of this project are to:

- Screen a diversity of barley germplasm, including Canadian varieties, breeding lines and landraces/wild barley accessions to understand variation for salinity tolerance and identify possible sources to improve this trait in Canadian barley
- Quantify the effects of salt on root growth and overall root system architecture in barley lines differing in salt tolerance,
- Understand if GABA plays a role in salinity tolerance in barley by monitoring changes in root GABA concentrations,
- Use CRISPR to create GABA-T null mutants and determine if this is a viable means to obtain enhanced salinity tolerance.

## *DEVELOPING THE NEW SOIL SCIENCE FIELD FACILITY AT THE DEPARTMENT OF SOIL SCIENCE*

Every farmer knows that when you are getting your equipment ready to go to the field or when something breaks down, there is nothing like having one building in your operation where you can place your tools at the ready, and where you can work on your equipment, day or night, rain or shine. The new Soil Science Field Facility will be that building for the Department of Soil Science. A place where all our researchers can go to share our collective tools, and where we can stage our trucks and process samples before and after we head to the field. Our new 10,000 sq ft, $3.9 million facility will bring together all the operations presently being conducted at our three other facilities tucked away in different parts of the University campus, as well as provide us with additional needed space. The new facility is proposed to be located just as you enter the gates to the Crop Development Centre between the old 108th street road section and the present 108th street location in Saskatoon. Because of the generous support from the Saskatchewan Barley Development Commission, the new facility will provide us with the necessary capacity needed by the Department to continue field research operations for decades to come. This is truly an exciting time with planning currently well underway, and construction hoping to begin in the Fall of 2022.

**77%**

*of SaskBarley's expenses in 2020-2021 were spent on research.*

## *DETERMINING ALCOHOL CONTENT LEVELS FOR A PRACTICAL FERMENTATION*

Few people know that Dr. Michael Ingledew, emeritous professor at the University of Saskatchewan, revolutionized ethanol fermentation technology. In hindsight his findings were simple: yeast fermentation of sugars to alcohol is limited by the strain on the yeast; how the yeast was nourished; and the concentration of food (sugar) for the yeast to make alcohol. Dr. Ingledew used what he learned to develop a revolutionary strategy to coax fermentations from 4% to 5% alcohol by volume to 10, even 15% alcohol by volume in an industrial setting. This was helpful for the fuel ethanol businesses in Saskatchewan and worldwide as this huge increase in alcohol content in the fermentation saves massive amounts of energy during distillation, reduces water consumption, and allows the construction of much less expensive distilleries. With our research we wished to further extend the logic Dr. Ingledew developed and determine how high the alcohol content could be made in a practical fermentation. We surveyed 28 cultivars of barley, which is rich in starch that can be converted to sugar for the yeast to consume. Before fermentation, the grain was milled and rapidly cooked in hot water. Enzymes were added to break down the starch to simpler sugars that nourish the yeast and are converted to ethanol. During fermentation, using less water helped to concentrate the sugar and our first goal was to produce the most concentrated sugar possible. The mixtures we fermented started off as almost solid, thicker than porridge. The next steps were to select and optimize barley, yeast, and added nutrients to see which produce the highest alcohol content. We were able to achieve a beer that was over 25% alcohol by volume. These fermentations were practical, and took only 3 days using a single strain of yeast.

## *MANAGING, CONTROLLING KOCHIA IN THE CANADIAN PRAIRIES*

Kochia is a problematic tumbleweed in the southern Canadian prairies, where it can cause significant crop yield losses. Evolved resistance to group 2, 4, and 9 herbicides limits the chemical options available for kochia control in several field crops, while unique biological characteristics allow this weed to thrive when exposed to drought, heat, or salinity. This project aims to further our understanding of auxinic (group 4) herbicide resistance in kochia, establish proactive surveillance for new types of herbicide resistance, and develop new tools and strategies to manage kochia in small grain cereal crops like barley and wheat. Research completed so far identified variable cross-resistance to the synthetic auxin herbicides dicamba and fluroxypyr in Canadian kochia populations (see Figure on previous page) (Geddes et al. 2021a).

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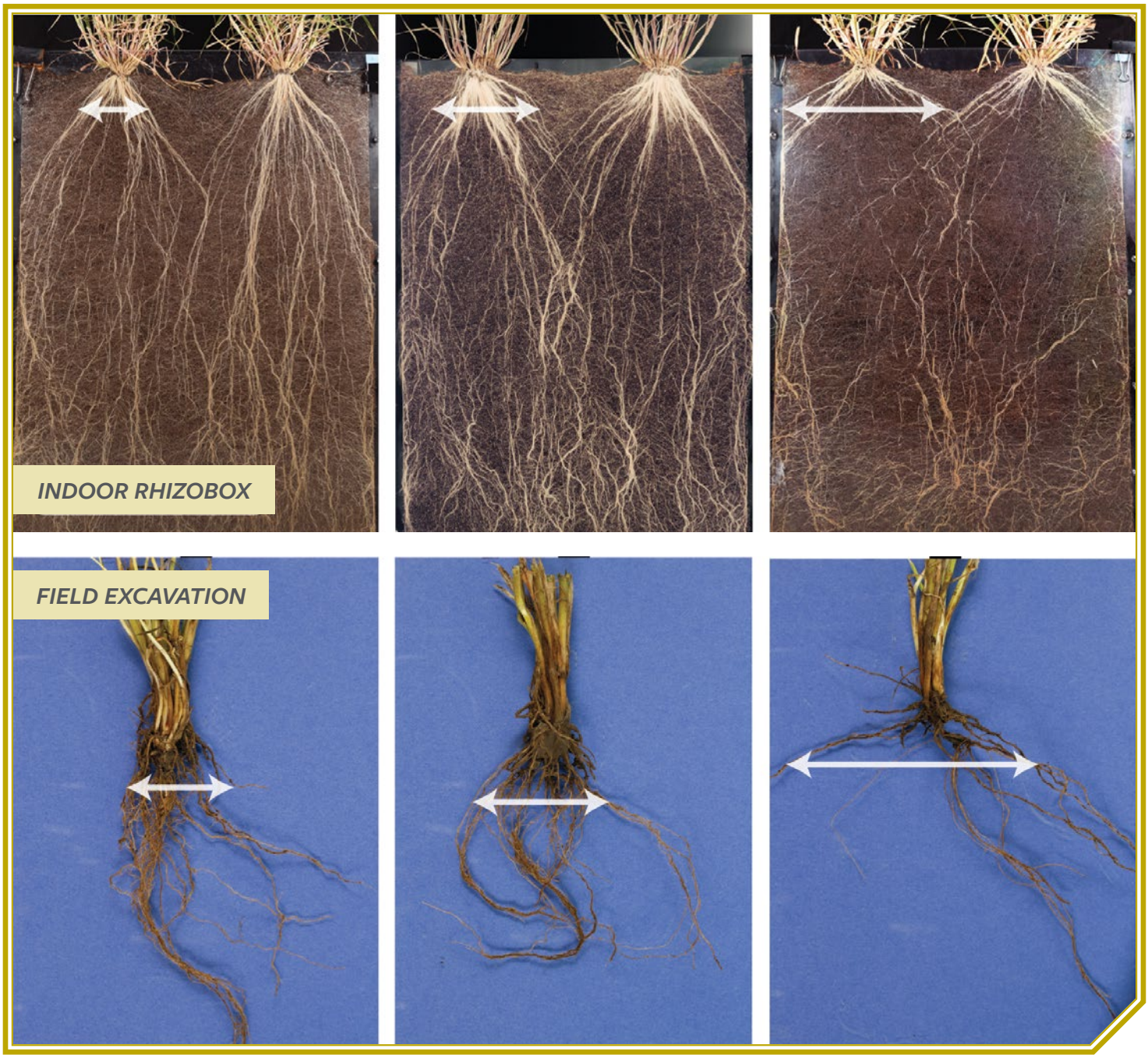
# ROOT PLATE SPREAD (*ARROWS*) IS ASSOCIATED WITH LODGING RESISTANCE



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For example, 28% of the kochia populations collected during a 2017 survey of Alberta were resistant to at least one synthetic auxin herbicide. However, 15% were resistant to dicamba only, 9% were resistant to fluroxypyr only, and only 4% were cross-resistant to both dicamba and fluroxypyr (Geddes et al. 2021b). These results suggest that kochia populations resistant to one synthetic auxin active ingredient may be susceptible to another. The mechanism(s) conferring auxinic resistance in Canadian kochia populations remain unknown and are the focus of ongoing research. Together, these activities will provide farmers and agricultural industry with knowledge of auxinic herbicide resistance in kochia, how to mitigate the spread of these biotypes, and help identify new tools for kochia control.

## DEVELOP FUSARIUM HEAD BLIGHT RESISTANT WHEAT AND BARLEY FOR PRODUCERS IN WESTERN CANADA

Fusarium head blight (FHB) is a destructive disease of barley and wheat caused by a group of *Fusarium species* that produce harmful mycotoxins, such as deoxynivalenol (DON). DON is not only responsible for significant yield damage, but also represents a food safety threat. Furthermore, DON interferes with some downstream processes with negative impacts for the malting and brewing industries. Emergent *Fusarium* strains in North America are more aggressive and produce more DON. Genetic surveys show that they now represent the majority of the Canadian *Fusarium graminearum* population. Wheat is the most widely FHB-affected crop and suffers the largest damage; barley is the next most affected crop, where 6-row barley is nearly as susceptible as wheat. Billions of dollars in damage have been incurred in FHB outbreaks especially in Eastern Canada, although incidence and impact have been on the rise in Alberta and Saskatchewan. Our objectives are to assist breeding programs in the development of fusarium head blight resistant wheat and barley for producers in western Canada. We are using a method that employs high selection pressure for the development of bread wheat and barley lines with high levels of disease resistance. In this project we will continue to generate FHB resistant germplasm, but will also develop a mutagenized population which can be used in breeding programs, provide a genetic resource for marker development, and to identify novel resistance and susceptibility genes.

*Lodging and mechanical failure of the stem or root system is a significant issue in barley.*

## GETTING TO THE ROOT OF THE BARLEY LODGING PROBLEM

Lodging and mechanical failure of the stem or root system is a significant issue in barley leading to yield reductions and economic losses for Canadian producers. Development of barley varieties with improved lodging resistance is thus a high breeding priority. Overall, the main goal of the project is to associate root and stem structure traits to lodging observed in the field to identify preferred traits for increased standability. The initial phase of the project will assess 12 barley genotypes (relevant to western Canadian production) in field experiments for lodging and traits associated to standability including stem strength and root anchorage strength. Field experiments will also explore root architecture through excavations of the crown root system. In parallel with the field experiments, the 12 barley genotypes will be thoroughly characterized by root phenotyping approaches, include innovative 2- and 3-dimensional imaging approaches, in indoor growth facilities to assess root system architecture (RSA) traits. The subsequent phase of the project will assess RSA in a diverse set of 200 barley genotypes to identify variation in root traits that may be used to further improve lodging resistance. The final output from the project will be root and stem traits promoting robust standability which can be readily applied in barley cultivar development to select for new breeding lines with the utmost lodging resistance. Project progress to date has been positive, for example, wider seminal root angles, which predict root system width and root plate spread, have been identified in Prairie cultivars and consistently associate with lodging resistance.

## STAYING AHEAD OF EVER EVOLVING CEREAL PATHOGENS

Crop pathogens are smarter than researchers and they evolve at a much faster rate. This poses a challenge for breeders and pathologists to breed for disease resistance. This project aims at understanding changes in pathogen populations of wheat and barley in near real-time (~3 days) using modern, cutting-edge portable handheld genome sequencers. The barley pathogen on our radar is net blotch, one of the most devastating leaf spotting pathogens in Saskatchewan and western Canada. Not only rapid pathogen characterization but our ultimate goal is to find resistant sources to some of the most devastating pathogen strains. The rapid, near real-time characterization of pathogen populations from the Prairies will help us come up with better management options.

# Tips to keep your farm safer

## Agriculture is one of Saskatchewan's largest and most hazardous industries

Approximately 13 people are killed on Saskatchewan farms each year. But there are simple ways to prevent injuries and accidents, prevent needless suffering and protect farm revenues.

Approximately 13 people are killed on Saskatchewan farms each year. Of these fatal injuries, most involve machinery and equipment. Most incidents occur in the farm yard.

(Statistics provided by the Saskatchewan Farm Injury Surveillance Program at the University of Saskatchewan.)

Everyone can do their part to help make Saskatchewan farms safer.

**For more information and resources on the responsibilities on the farm for employers and employees visit: www.saskatchewan.ca**

### SOME TIPS TO REMEMBER WHILE FARMING INCLUDE:

- Be sure to replace all guards and shields following maintenance and repairs. A few extra minutes might save your life or a limb.
- Ensure employees and others helping on the farm are properly trained.
- Change jobs periodically or take a short walk to help you stay focused.
- Watch for overhead lines when moving equipment, augers, bins, and when loading grain trucks and semis.
- If youth are recruited to help with farming, make sure the activities are age appropriate and everyone is properly trained and supervised.

Source: Government of Saskatchewan

# FERTILE GROUND

## Soil fertility planning for 2022

**by Mitchell Japp**
*SaskBarley*

Exceptional drought and heat during the 2021 growing season, particularly July and August, resulted in stunted crop growth and poor yields across much of the province. The drought accelerated maturity, leading to an early harvest. What happened to the fertilizer applied in spring? And what do you plan for next year?

Soil tests are best taken as close as possible before seeding starts. This timing offers the best estimate of soil available nutrients. However, logistics makes this challenging. A lot of soil samples have already been collected this fall. Ideally, fall soil samples are taken when soil temperatures have dropped below 10 C; however, once again logistics requires an earlier start to the sampling season than that. Once soil temperatures are cool, most soil processes are limited and will not change the soil nutrient pools much until the soil warms up in the spring.

Late August rains led to some regrowth in crops. Canola has been regrowing from the roots, while cereal crops appear to have had notable losses through the combine, or possibly shattering. Losses through the combine may have been from smaller seeds, that were still viable for growth. Normally, we would have expected these volunteers to be killed by frost. 2021 certainly has not been normal. Nevertheless, the regrowth in these fields will have been using both moisture and nutrients. Soil tests taken in the early fall may not reflect the nutrients used by these volunteers.

Barley that follows canola that has had a lot of regrowth or another cereal that had significant growth from volunteers may be planted in a field that has significant amounts of nutrients tied up, compared to normal, or even from soil tests taken in the early fall. What we really don't know, is how quickly those nutrients will be released and what portion will become plant available.

Dr. Jeff Schoenau led a study focused on wild oats to evaluate nutrient tie-up when weed control is delayed. The research team found that significant amounts of nutrients could be tied up with wild oats. They also found that the release of the nutrients was slower and recovery was limited, particularly as the wild oats plants grew older. However, with the late 2021 volunteers, the plant residues will be frozen over winter, which may accelerate decomposition and snow melt (should there be any) may aid nutrient movement from decomposing plants into the soil. Regardless, we should anticipate some nutrient losses and tie-up.

Anecdotally, there was more variability in fields in 2021 than most years. I both observed and heard from farmers areas in fields where yields would be good and other areas that were exceptionally poor or had no yield at all. Most likely this variability is present all the time, but when the field is averaging 70 instead of 7 bu/ac, those differences are less obvious. Now that field variability is so obvious,

a single soil test from a field (bulked from 10-15 cores) seems inadequate. Sampling at least high and low producing areas separately will provide more information. Many producers and agrologists sample more zones than that though. Once there is more than one soil test on a field, then the questions begin. Blanket application rate or variable rate? Do low producing areas respond to more fertilizer or is less appropriate? Will the crop still stand up with more fertilizer in high producing areas? In a blanket application, should the focus be on high or low producing areas? Those questions are needed and a consequence of more information, but finding some answers will enhance next year's fertility program.

Now is a great time to start a conversation with an agrologist to make a plan for next year. It may be worthwhile to re-test a few fields in the spring to see if the results changed, if those fields had significant growth this fall. And, field uniformity is certainly worth taking a close look at. The differences were obvious in 2021, so now is a good time to think about making adjustments to fertility plans.

*Reference: J.J. Schoenau, A. Bayar, R. Holm, K. Sapsford. 2009. Wild Oat Nutrient Uptake and Release from Residue. Soils and Crops Proceedings. 2009.*

# 2021 – A Year for the History Books

## A look back at our growing season

**By Mitchell Japp**

*SaskBarley*

In 1863, John Palliser presented his report to the British Parliament that the area now known as Palliser's Triangle, was too arid for crops and unsuitable for habitation. It turns out that Palliser's expedition was during a period of drought. For more than a century, Saskatchewan farmers have been defying Palliser, living and growing crops in an area that is sometimes too arid. I wonder what Palliser would have thought about 2021?

Unfortunately, Environment Canada data does not quite go back to the 1857-1859 range when Palliser was on his expedition, but it seems like a fair guess that Palliser would have thought similarly about 2021. Undoubtedly, 2021 was a year of extremes.

The growing season started with less than ideal soil moisture. Last fall, Les Henry's soil moisture map indicated most of Saskatchewan was very dry, rounded out by some areas being just dry. There was decent snowfall in many areas and the first crop report of the season showed soil moisture as between short and adequate in many areas.

Barley tends to be seeded early, which allowed it to be seeded into some moisture – getting enough moisture to get growing. There was enough for a crop to hang on until most of the province received some rain around the May long weekend. Very little rain had fallen, province wide until then. As if early indications of drought weren't enough, there were several frost events until late June, including widespread frost in the second week of June.

Exceptionally late spring frosts were contrasted by some exceptionally hot days. Maps of minimum and maximum temperatures for each week are included in the Crop Report from the Saskatchewan Ministry of Agriculture. The maps show the extent nicely, but in order to draw comparisons to recent years, I looked at Environment Canada data for Regina. I found that from May through July, there were 22 days exceeding 30 C in Regina in 2021. Since 2010, only two other years even made double digits for days over 30 C.

This summer, I connected with Dr. Phillip Harder on the Barley Bin podcast, after he tweeted about the extremes he was observing in Saskatoon with heat and drought. On the podcast, Dr. Harder told me that as the heat continued into August, 2021 started to stand out, over and above any other year since 1945.

The crops grown in Saskatchewan really do not like that kind of heat. Days over 30 C translate to lost yield potential. That kind of heat, means the plant cannot move enough water to keep up with losses. And when combined with low rainfall and no stored soil moisture, the results are painfully obvious and confirmed by low yielding crops. Saskatchewan Agriculture estimates barley averaged 38 bu/ac this year, down from a 10 year average of 61 bu/ac. And, the 2021 average will have been skewed higher because many fields have been baled, so the worst areas likely did not get counted.

Still, there were a few positives to take away from 2021. Despite exceptional drought and heat, the skies were not filled with dust. Smoke at times, but not dust. The topsoil was preserved. Harvest conditions were excellent and a long fall has allowed time for some catch up on jobs that may have been outstanding. Prices have remained strong, which will help with low yields. And, despite many challenges, some areas did well, with a few positive reports of areas that caught rain at just the right time. Those reports are positive to hear and give some optimism for what can be grown in moisture efficient systems that Saskatchewan farmers have developed that allow them to continue to defy Palliser.


*Photos courtesy Rebellion Brewing Company*

# Rebellion Brewing Company

## Punk rock Regina brewery aims to make great beer that builds strong community

**By Melanie Epp**

The first time Mark Heise, president and CEO of Regina's Rebellion Brewery Company, visited Rodney McNevin's malt barley fields in Carrot River, Sk., it was calling for heavy rain. Mark had never been on a barley farm, and he'd certainly never driven a combine. While McNevin worked hard to beat the storm he shared with Heise the challenges of growing barley and what it takes to make malt. Two years later, it's a relationship that Rebellion Brewery continues to foster.

Founded in 2014, Rebellion Brewing is the passion project of Mark Heise, Evan Hunchak, Jaimie Singer and Neil Braun. The brewery embraces a bit of punk rock, DIY attitude. Their aim is to make great beer that builds strong communities. Working closely with farmers is just one of the ways they do that.

"The real value of being a brewer on the prairies is that the barley itself is grown just about out your back door, so it makes the opportunity to meet those producers pretty darn easy," said Heise.

Sitting in the combine with McNevin, Heise realized that neither party had a good understanding of what the other one does. When you rely so heavily on one another, though, those conversations become crucial.

During one farm tour, Heise took beer out to the field and gave it to the visiting farmers to try. They said it tasted weird. This is what beer tastes like when you don't add corn syrup, Heise said, explaining that Rebellion beer is made with 100 per cent Saskatchewan-grown barley.

"Once I explained it to them that way, well, then then they wanted another glass," he said.

"It's been really awesome to start having those conversations, and connecting those dots with people," he added.

In August of this year, Rebellion's communications manager Matthew Barton interviewed

***Rebellion team photo from when the company won Gold for its Hoppy Pollinator, and Gold and Best in Show for its Sour Red at the Canadian Brewing Awards. (Back row L to R: Landon Leibel, Dee Swayn-Shannon, Neil Lutz, Zaul McLellan, Andrew Biss; middle row: Kaley Stallard, Vanessa Owen, Walker Cowan, Mark Heise; front row: Paul Chicoine, Elyse Crook, Jasmine Franks, Jeff Harms, Stephanie Robb.*** *Photo by Matthew Barton.*

University of Saskatchewan crop scientist Aaron Beattie for the brewery's weekly podcast. Beattie explained to listeners how drought impacts farmers and the crops they grow.

Poor quality doesn't just impact producers. It also impacts maltsters and brewers. Malt barley produced under extremely dry conditions is high in protein and low in starch. The resulting malt is darker in colour, and the malting process is slower. Higher protein levels also give the resulting beer a hazy appearance.

"There are a lot of knock-on effects that can be bad for both the maltster and the brewer," Beattie said in the interview.

Rebellion Brewing Company works closely with other farmers too. Their Lentil Beer features King Red Lentils, and they use whole leaf hops produced by JGL Shepherd Farms near Moosomin. Their primary malted barley comes from Prairie Malt in Biggar, but they also use barley from Maker's Malt in Rosthern.

The brewery also relies on locally-produced honey, and fruit, such as prairie cherries, that comes from Lumsden's Over the Hill Orchards. Boreal Heartland supplies foraged ingredients, such as roots, birchbark and spruce.

"We do want to preserve tradition and quality while also still being innovative with new brewing methods and new recipes," said Heise. "But yeah, we're trying to make really, really good beer. And if you don't have really good ingredients, you can't make good beer."

## 5 BEERS TO WATCH FOR THIS FALL/WINTER

***1. FLO MINGO MAJESTIC MILKSHAKE IPA:*** A dragonfruit milkshake IPA featuring sparkles (proceeds from sales will be donated to Lulu's Lodge, a safe home for LGBTQ youth).

***2. PEACH SOUR SMOOTHIE:*** A tasty, peachy brew with a smooth finish.

***3. ROOT BEER:*** Rebellion's 7th Anniversary beer, which features local ingredients like sarsaparilla.

***4. MEGA LAZER CAT:*** A bigger, bolder version of Cat's Got the Cream, with a higher ABV.

***5. CAT'S GOT THE CREAM:*** Rebellion's most popular seasonal beer is creamy, malty and sweet. It features Mexican vanilla and a wonderful, rich caramel flavour and aroma.

**THE SASKATCHEWAN BARLEY DEVELOPMENT COMMISSION:**

The Saskatchewan Barley Development Commission was established in 2013 under the Agri-Food Act, 2004

**SASKATCHEWAN BARLEY DEVELOPMENT COMMISSION (SASKBARLEY)**

Jill McDonald, Executive Director
Direct Tel: 306-370-7237
jmcdonald@saskbarleycommission.com

**OFFICE HOURS:**
Monday to Friday
8:30 a.m. - 4:00 p.m.

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