ALBERTA CANOLA
SaskCanola
Manitoba Canola Growers
canolacouncil OF CANADA

November 2021

canola DIGEST

The Source for Canada's **Canola Growers**

MARKETING 2022

SIX FARMER PANELISTS, INCLUDING CODIE NAGY FROM SASKATCHEWAN, EXPLAIN HOW EXPERIENCES IN 2021 MAY CHANGE THEIR MARKETING STRATEGIES FOR 2022. / PAGE 10

INSIDE:

GROWING CONFIDENCE WITH RESULTS.

See how InVigor® hybrid canola is performing near you.

Go to **InVigorResults.ca** for:

- Replicated yield results from your area
- Results for Pod Shatter Reduction hybrids
- Results for clubroot-resistant hybrids
- Competitive comparisons – see why more growers choose InVigor

Look inside for full details on our hybrid lineup for 2022.

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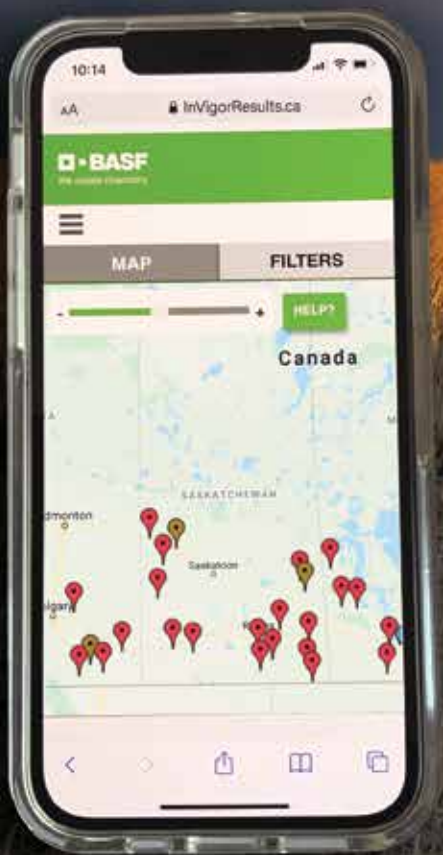

We update our hybrid leaderboard weekly. So be sure to check back often to see the lastest results on how InVigor is performing in your area.

Because it's not just how you start that counts. It's how you finish.

InVigorResults.ca

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Always read and follow label directions.

CHECK OUT OUR 2022 INVIGOR HYBRID CANOLA LINEUP.

Hybrid	Description	Yield	Growing Zones/ Maturity	Agronomic Trait/ Blackleg Rating
NEW InVigor L343PC	New InVigor L343PC combines performance with protection. This high-yielding Pod Shatter Reduction hybrid contains second-generation clubroot resistance[1] and offers a significant yield increase over InVigor L234PC plus improved standability.	**111.3%** of the checks (InVigor L233P and Pioneer® 45H33) in the 2019/2020 WCC/RRC[2] trials **106%** of InVigor L233P (n=43 trials, 2019/2020)	**All** growing zones 1 day later than InVigor L234PC	Pod Shatter Reduction 2nd generation clubroot resistance **R** (Resistant)
NEW InVigor L356PC	For growers targeting that extra bushel or two out of their canola, new InVigor L356PC is here. InVigor L356PC was our highest-yielding hybrid in the 2020 WCC/RRC trials. It also combines first-generation clubroot resistance[3] with Pod Shatter Reduction technology and features strong standability.	**113.8%** of the checks (InVigor L233P and Pioneer® 45H33) in the 2019/2020 WCC/RRC trials **108.8%** of InVigor L233P (n=38 trials, 2019/2020)	**All** growing zones ½ day earlier than InVigor L255PC	Pod Shatter Reduction 1st generation clubroot resistance **R** (Resistant)
InVigor L357P	This Pod Shatter Reduction hybrid carries the unique distinction of containing exceptional blackleg resistance as well as providing high yields. InVigor L357P is a great fit for growers who irrigate or when lodging is a concern in non-clubroot areas.	**112.9%** of the checks (InVigor L233P and Pioneer® 45H33) in 2018/2019 WCC/RRC trials **109.7%** of InVigor L233P (n=39 trials, 2018/2019)	**Mid to long** growing zones	Pod Shatter Reduction **R** (Resistant) - Very strong
InVigor L340PC	High yield, mid maturity, Pod Shatter Reduction and first-generation clubroot resistance—InVigor L340PC has it all. With strong standability, it excels in fields under irrigation or when lodging is a concern.	**108.9%** of the checks (InVigor L233P and Pioneer® 45H33) in 2019 WCC/RRC trials **107.8%** of InVigor L233P (n=16 trials, 2019)	**All** growing zones	Pod Shatter Reduction 1st generation clubroot resistance **R** (Resistant)
InVigor L345PC	As the highest-yielding hybrid at the 2020 Canola Performance Trials (Straight Cut), InVigor L345PC offers a significant jump in yield potential over InVigor L233P. It also features our patented Pod Shatter Reduction technology and first-generation clubroot resistance.	**111.9%** of the checks (InVigor 5440 and Pioneer® 45H29) in 2017/2018 WCC/RRC trials **111.4%** of InVigor L233P (n=28 trials, 2018)	**All** growing zones	Pod Shatter Reduction 1st generation clubroot resistance **R** (Resistant)
InVigor choice LR344PC	InVigor Choice hybrid with Pod Shatter Reduction technology and first-generation clubroot resistance. InVigor LR344PC features both the LibertyLink® technology system and TruFlex™ canola with Roundup Ready® Technology. Perfect for growers looking to combine high-yielding InVigor genetics with the flexibility of Liberty® herbicide or Roundup® herbicide applications.	**104.1%** of the checks (InVigor L233P and Pioneer® 45H33) in 2018 WCC/RRC trials **103.6%** of InVigor L233P (n=12 trials, 2018)	**All** growing zones	Pod Shatter Reduction 1st generation clubroot resistance LibertyLink technology system and TruFlex™ canola with Roundup Ready® Technology **R** (Resistant)
InVigor L233P	Germination magazine's 2021 Seed of the Year. InVigor L233P has been grown on more acres than any other InVigor canola hybrid in Western Canada. Featuring patented Pod Shatter Reduction technology, this very early maturing, high-yielding hybrid provides the harvest flexibility you can count on.	**108.8%** of checks (InVigor 5440 and Pioneer® 45H29) in 2014/2015 WCC/RRC trials	**All** growing zones	Pod Shatter Reduction **R** (Resistant)
InVigor L234PC	This early-maturing Pod Shatter Reduction hybrid contains second-generation clubroot resistance[1], which makes it a great fit for growers in known clubroot-affected areas who still want performance.	**104%** of the checks (InVigor 5440 and Pioneer® 45H29) in 2017 WCC/RRC trials	**All** growing zones	Pod Shatter Reduction 2nd generation clubroot resistance **R** (Resistant)
InVigor L255PC	InVigor L255PC is a Pod Shatter Reduction hybrid with first-generation clubroot resistance that separates itself from other hybrids due to its very impressive standability. It's a great fit for growers in the mid to long growing zones and in fields under irrigation or when lodging is a concern.	**109%** of the checks (InVigor 5440 and Pioneer® 45H29) in 2016 WCC/RRC trials	**Mid to long** growing zones	Pod Shatter Reduction 1st generation clubroot resistance **R** (Resistant)
InVigor L241C	You can expect strong standability and high yields from this mid-maturing hybrid. With first-generation clubroot resistance, InVigor L241C is well suited to all clubroot-affected regions of Western Canada for growers that prefer to swath.	**102%** of the checks (InVigor 5440 and Pioneer® 45H29) in 2012/2013 WCC/RRC trials	**All** growing zones	1st generation clubroot resistance **R** (Resistant)
InVigor L252	A consistent top performer for growers that prefer to swath, InVigor L252 continues to offer incredible yield performance and strong standability with mid-season maturity.	**110%** of the checks (InVigor 5440 and Pioneer® 45H29) in 2011/2012 WCC/RRC trials	**All** growing zones	**R** (Resistant)
InVigor health L258HPC	This high-yielding hybrid is suitable for all mid to long growing zones and offers the patented Pod Shatter Reduction technology as well as first-generation clubroot resistance. InVigor Health L258HPC produces a specialty oil profile that is more heat stable and higher in oleic acid. Its strong standability also makes it a great fit for fields under irrigation.	**104.9%** of the checks (InVigor 5440 and Pioneer® 45H29) in 2017 WCC/RRC trials	**Mid to long** growing zones	Specialty oil Pod Shatter Reduction 1st generation clubroot resistance **R** (Resistant)

Results may vary on your farm due to environmental factors and preferred management practices

[1] We recommend growing InVigor L343PC and InVigor L234PC with second-generation clubroot resistance after two cycles of growing first-generation clubroot-resistant hybrids in clubroot-affected areas or when clubroot symptoms appear in first-generation clubroot-resistant hybrids (whichever comes first).

[2] Western Canadian Canola/Rapeseed Recommending Committee.

[3] To predominant pathotypes found in Canada at the time of registration. InVigor L356PC, InVigor L340PC, InVigor L345PC, InVigor Choice LR344PC, InVigor L255PC, InVigor L241C and InVigor Health L258HPC share the same first-generation clubroot resistance profile. InVigor L343PC and InVigor L234PC have this resistance profile, plus they contain second-generation multigenic clubroot resistance to additional clubroot pathotypes to help combat evolving clubroot pathogens.

canola DIGEST
November 2021

DEPARTMENTS

CALENDAR

ALBERTA CANOLA – GROWER ENGAGEMENT MEETINGS
Lethbridge – November 17, 2021
Nisku – November 23, 2021
Red Deer – December 7, 2021
Grande Prairie – December 14, 2021
Online – January 6, 2022
albertacanola.com/events

CANOLA WATCH WEBINAR SERIES
Starts November 24, 2021
Check canola organization websites for time and registration.

CANOLA WEEK, INCLUDING CANOLA DISCOVERY FORUM
Online
November 30-December 2, 2021
canolacouncil.org/research/canola-week

SASKCANOLA – AGM
Prairieland Park, Saskatoon, Saskatchewan
January 11, 2022
saskcrops.com

ALBERTA CANOLA – AGM
Edmonton, Alberta
January 25, 2022
albertacanola.com

FARMTECH CONFERENCE 2022
Edmonton, Alberta
January 25-26, 2022
farmtechalberta.ca

CROPCONNECT CONFERENCE
Winnipeg, Manitoba
February 16-17, 2022
cropconnectconference.ca

MANITOBA CANOLA GROWERS – AGM
February 17, 2022
canolagrowers.ca

CANADIAN CROPS CONVENTION 2022
Ottawa, Ontario
March 8-10, 2022
canadiancrops.ca

PROVINCIAL BULLETINS

4 ALBERTA CANOLA

Alberta Canola is hosting a series of five Grower Engagement Meetings beginning in November leading up to the Annual General Meeting. Alberta Canola's hybrid Annual General Meeting takes place on Tuesday, January 25, 2022. Visit **albertacanola.com/vote** to register.

6 SaskCanola

Canola meal can really shine in livestock diets. SaskCanola strategically invests in various areas of canola research – including canola utilization – which benefits both crop and livestock producers. SaskCanola awards Morris Sebulsky funding to Agri-ARM research organizations.

8 Manitoba Canola Growers

Nomination deadline for directors is November 30. Join us! Manitoba Canola Growers works with a variety of partners to amplify the voice of farmers and to promote agriculture, farmers, and Canadian ingredients. Partners include Farm to School Fundraiser, Great Taste of Manitoba TV show, and Ag in the Classroom.

THE CANOLA DIGEST IS A JOINT PUBLICATION OF:

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THE EDITOR'S DESK

Breadbasketcase

Canada has just under 90 million acres of cropland, according to the census*, and the Prairies account for most of them. That sounds like a lot, but we are small potatoes.

The global cropland area is 3.8 billion acres, according to the Food and Agriculture Organization of the United Nations (FAO). About 1.5 billion acres are in Asia, with China and India on top. Europe has around 750 million. North America is fifth among continents for cropland area, and the U.S. has most of it.

For Canada, cropland area doesn't mean much. What matters is how we protect that cropland. If Canada can maintain the productivity of its soil, we will become a bigger part of a global food supply chain that is under strain from water shortages and degraded soil. We are already one of the few exporters other countries turn to when domestic production can't meet demand. This is and will be our competitive advantage. When cupboards are empty, we are one of the few stores that remain open.

Food insecurity can be ugly. New York Times reporter Thomas Friedman has a video series called "The Years Project". In one episode, called Syria's Climate War, Friedman argues that four years of drought from 2006-10 led to the conflict in Syria. Climate change over the past forty years has reduced agriculture productivity throughout the Middle East, Friedman says, quoting the U.S. National Oceanic and Atmospheric Administration, and it came to a boil in Syria.

"Climate change is now well understood to be a major national security issue and a source of stress on a number of the underlying causes of conflict," says Susan Rice, a U.S. national security advisor quoted in the video. "Where there is drought, where there is insecurity, when there is poverty, hunger, poor governance, repressive policies, it may make the tinder in the box more readily ignitable."

Countries that take care of the farmers who take care of the land should have a long-term advantage. Policies to protect Canadian cropland productivity benefit everyone. That is why we need to first recognize, through research, the practices that truly make a difference, and then give farmers the agronomy to adopt these practices. Farmers and modern agriculture practices are not the enemies of a better planet. They are essential allies in meeting food demand while adapting to climate change and taking steps to reduce climate change.

A comment I heard on the National Day for Truth and Reconciliation made me think of this. That morning, the Canadian Canola Growers Association invited Canola Council of Canada staff, including me, to participate in a presentation by Gerry Oleman from the St'at'imc nation at Shalalth, B.C.

"We live in a beautiful country," Oleman says. "We must maintain its beauty by working together. We must act so that our children will have what we have – and more."

To make sure our children also enjoy the benefits of Canada's agricultural productivity, we have to work together to protect Canada's cropland.

While some parts of the world may degrade into breadbasketcases, Canada can be the breadbasket. To do that, we need to work together on clear long-term objectives and then fund the research necessary to identify those practices that will achieve these objectives most efficiently.

I believe we can sequester more carbon, improve nutrient use efficiency, improve biodiversity, reduce emissions and improve productivity on the Prairies. Protecting our beautiful country while being a breadbasket for the world will benefit all Canadians. Farmers cannot carry this basket alone.

**The 2011 Census put Canada's cropland area at 87.4 million acres. This does not include pasture land.*

Grower Engagement Meetings

Alberta Canola is hosting four Grower Engagement Meetings across Alberta during November & December 2021.

These events are scheduled to be in-person events at the following locations:

LETHBRIDGE
NOVEMBER 17

NISKU
NOVEMBER 23

RED DEER
DECEMBER 7

GRANDE PRAIRIE
DECEMBER 14

The four Grower Engagement Meetings will look different than the 12 regional meetings traditionally hosted by Alberta Canola.

These meetings will provide growers with an improved opportunity to gain insight into the activities of Alberta Canola and to provide feedback directly to their elected farmer directors. This year's events will take a deeper dive into Alberta Canola funded research and look into the most active policy files for canola farmers.

For more information and to register visit **albertacanola.com/GEM**

Additionally, there will be one online Grower Engagement Meeting on January 6, 2022

Annual General Meeting Announcement

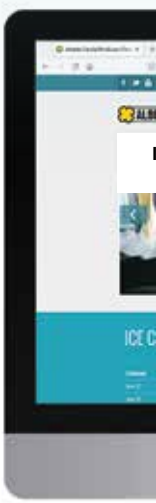
TUESDAY, JANUARY 25, 2022

Alberta Canola's Annual General Meeting will take place during the FarmTech Conference. Canola growers in Alberta will be able to participate in, and vote at the AGM either in person or virtually.

AGM agenda includes: review of the activities, audited financial statements, and budget, voting on director elections (if there are vacancies at the time of the AGM), and voting on resolutions.

Resolutions to be presented at the AGM must be received no less than 10 business days prior (January 11, 2022) to the AGM.

In order to ensure the integrity of the voting procedure, growers joining us online will need to register to vote. Growers attending the AGM in-person or online are encouraged to register to vote by January 14 to ensure voting platform access at **albertacanola.com/vote**.



For more details and to register, please visit **albertacanola.com/vote**

KEEP UP TO DATE. Receive the latest news, media releases and daily grain prices when you subscribe to the Alberta Canola Connections Newsletter. Visit **albertacanola.com/subscribe** today.

ALBERTA CANOLA

Voting Online

Farmers in Alberta that have sold canola and paid a service charge on canola to Alberta Canola since August 1, 2019 are eligible canola growers and can register to vote.

Eligible canola growers can be individuals or represent a corporation, partnership, or organization.

In order to ensure the integrity of the voting procedure, growers will need to register to vote. This will allow Alberta Canola to verify eligible voters, and therefore enable our third-party voting provider to provide growers with a unique access code to allow them to vote.

Voter registration closes January 12, 2022.

Vote

Voter registration closes January 12, 2022.

For more details and to register, please visit albertacanola.com/vote

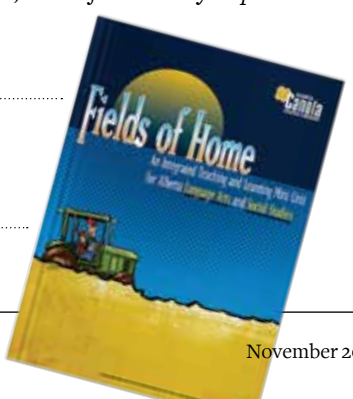
Credit: iStock.com/patat

Fields of Home Animation

The graphic novels, *Fields of Home* & *L'Or dans les champs* (French version), that have a basic introduction to the history of canola are now fully animated. The part fiction, part canola fact story leads young readers through a time travel adventure.

The Fields of Home animations and graphic novels align with grade 4 and grade 5 English Language Arts and Social Studies curricular outcomes in Alberta. The English versions are also supported by a teacher's guide, *Fields of Home StoryScape*.

The videos can be viewed on **learncanola.com/videos**



Investments in canola utilization research

Canola meal utilization research important to crop and livestock producers

SaskCanola strategically invests in various areas of canola research, including canola utilization – which benefits both crop and livestock producers. "Research funded by Saskatchewan canola growers has demonstrated the benefit of canola meal in the diets of dairy cattle," says Dale Leftwich, Policy Manager with SaskCanola. "This has elevated canola meal from a by-product to a highly valued feed component used in dairy rations all over the world. New research on feed rations for beef cattle not only have tremendous benefits here in Saskatchewan, but it could be the foundation for new export markets."

A recent project led by University of Saskatchewan researcher Gregory Penner compared protein source and frequency of supplementation on forage intake, competitive feeding interactions, and nutrient utilization for beef cattle fed low-quality forage. "There are quite a few situations in Western Canada where protein may be limiting for diets of beef cattle, particularly for growing steers and replacement heifers," explains Penner. "There are points in time in grazing systems when plants are senescent or mature, or when grazing crop residues where protein supplementation will be beneficial. The results of our study, which were very consistent with what had been reported in the literature, showed that protein supplementation increased growth performance and forage intake for heifers fed protein-deficient forage."

In the study, yearling heifers were fed either canola meal or distillers' grains, daily or every second day, as protein supplements to low-quality forage diets. The growth performance responses in the study were remarkable, with gains that were more than 0.8 pounds per day over the control, and really shows that control cattle were limited on protein to meet their daily requirements. The study also showed feeding double the amount of protein supplements every second day was sufficient, saving producers time, labour and machinery costs.

"From a diet cost perspective and how it pencils in, canola meal really shines," adds Penner. "Although performance results of feeding canola meal or distillers' grains were similar, the high quality canola protein was cheaper and more cost competitive when priced on a per unit protein basis. Canola meal is also a clean feed with few concerns, compared to feeds like grain screenings or distillers' grains where mycotoxins and other factors can be a problem. The results show that utilizing products like canola meal can provide a supplement solution to a feeding challenge for livestock producers utilizing stockpiled grazing and crop residues."

Credit: Dr. Gregory Penner, University of Saskatchewan

Research at University of Saskatchewan shows protein supplementation increased growth performance and forage intake for heifers fed protein deficient forage.

Penner has a new Ag Demonstration of Practices and Technologies (ADOPT) project underway in collaboration with the Saskatchewan Stock Growers Association (SSGA), and funded by Saskatchewan Cattlemen's Association and the Saskatchewan Ministry of Agriculture to demonstrate the benefits of canola protein supplementation to a commercial operation. The demonstrations will be set up at two farms to compare a straw/chaff grazing system with a stockpiled forage/mature forage stand system.

"We're finalizing the details and expect the trials to run over 60 days in October and November," says Chad MacPherson, SSGA general manager. "Each farm will provide 50 replacement heifers, with 25 control animals on grazing and the other 25 animals on grazing plus receiving canola pellet supplementation at a rate of 2.5 pounds per animal every second day." Body weights at the start and end will be measured as well as an estimate of forage intake and pellet delivery, with results expected by the end of the year.

With the increasing crushing capacity over the next couple of years in Saskatchewan, there will be additional local canola meal supply available. "However, in talking to crushers, although canola meal products are available, there are access issues for producers," says MacPherson. "There are currently some logistical issues as crushers don't sell direct to farm. They sell to brokers and then to feed mills. We are trying to raise awareness of the viability, benefits and cost competitiveness of canola meal, and hopefully someone will step up to commercialize canola meal pellets for this industry. It's great to see this symbiotic relationship between the crop and livestock sector for this local canola opportunity."

"From a diet cost perspective and how it pencils in, canola meal really shines."

—Gregory Penner

SaskCanola AGM – Mark your calendars!

The SaskCanola AGM is scheduled for Tuesday, January 11, 2022 at 1:30 PM at Prairieland Park in Saskatoon, in conjunction with other commissions.

The purpose of the AGM is to review the audited financials and activities from the previous year, including research investments, policy and advocacy initiatives, and grower programs. To help growers plan for the 2022 growing season, market analysts Chuck Penner and Marlene Boersch will present on the state of commodity markets.

Registered canola producers are eligible to vote on motions and resolutions. Registered canola producers include those who have grown and sold canola in Saskatchewan in the last two years and have not requested a refund in the previous year.

Anyone interested in bringing forward a resolution to the AGM is encouraged to reach out to the SaskCanola office by phone 306-975-0262 or by email info@saskcanola.com.

Find more information on the AGM at **https://www.saskcrops.com/**.

NOTE: Although an in-person event is planned, the AGM may be impacted by COVID-19. SaskCanola will comply with SHA guidelines when making decisions related to the delivery of the AGM. We will update all participants as more information becomes available. Growers will be provided with the option to attend the AGM virtually.

SaskCanola awards Morris Sebulsky Endowment Fund to eight Agri-ARM sites in Saskatchewan

Morris Sebulsky was a respected farmer from east-central Saskatchewan and a professor of agricultural engineering at the University of Saskatchewan. He was passionate about agricultural research, demonstration and application. He made a generous bequest of over $2.8 million to the University of Saskatchewan, the Saskatchewan 4-H Foundation, neighbouring towns and rural municipalities, and four commissions. SaskCanola has matched the funds received from the Sebulsky estate to invest in equipment and demonstration trials at the eight Agri-ARM sites across Saskatchewan.

Agri-ARM sites are non-profit producer-led applied research and demonstration organizations committed to supporting growers by promoting profitable and sustainable agriculture through facilitating agronomic research and technology transfer activities for the benefit of the agricultural community. Eight Agri-ARM sites are strategically located across Saskatchewan's main crop production areas to cover various soil climatic zones.

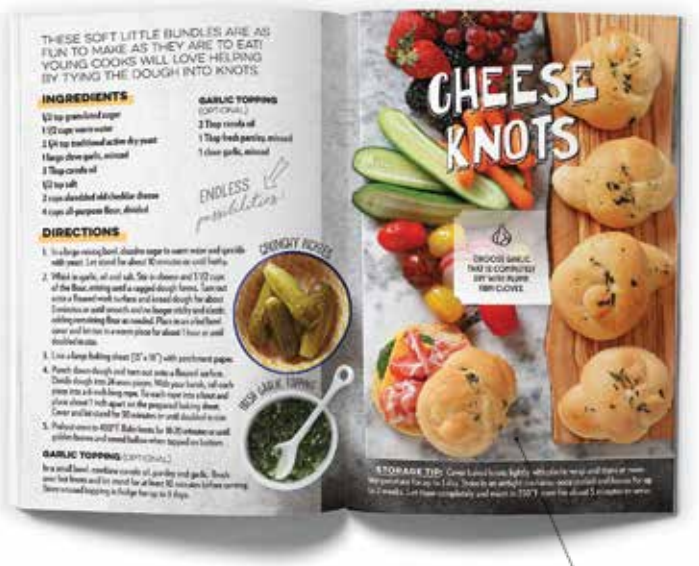
SaskCanola acknowledges and values the critical role of the Agri-ARM sites to our farming community and the comprehensive support and educational opportunities these sites provide to producers in the province. To further advance the capacity to conduct regional research relevant to local farmers and to address gaps that may exist through other funding opportunities, SaskCanola awarded investments from the Morris Sebulsky Endowment Fund over each of the last three years to the Agri-ARM sites.

"Primarily operating through project-based funding, it can be very difficult for Agri-ARM organizations to purchase or replace all of the equipment that is required to run our programs. The funds ultimately allow us to focus resources on our applied research and demonstration programs, while taking a great burden off of our capital spending plans," says Danny Petty, executive manager at Indian Head Agricultural Research Foundation (IHARF).

Research continues to be a cornerstone of SaskCanola's programming. About 40 per cent of levy dollars are invested in research initiatives to help growers and move the industry forward. SaskCanola is committed to supporting local research and extension activities relevant to growers' regional conditions and farming practices.

Power of partnership

Manitoba Canola Growers is dedicated to working with a variety of partners to amplify the voice of farmers through a strong community that works together to promote agriculture, farmers, and Canadian ingredients.



You can find the newest *Canola Eat Well: Share More Meals Together* booklet in your Farm to School veggie bags or order a copy by visiting **canolagrowers.com**.

Farm to School Fundraiser

Back in action, the Farm to School Fundraiser will deliver Manitoba vegetables into homes through the profitable fundraiser offered to schools and licensed daycares in the province. Through our long-standing partnership with Manitoba Association of Home Economists, Peak of the Market and the Government of Manitoba, we will include a recipe booklet geared at helping families make the most of their veggies – while including canola oil in your kitchen.

Great Tastes of Manitoba TV show

Great Tastes of Manitoba is a collaboration of Manitoba's leading commodity groups, bringing viewers a locally-produced television series that reaches more Manitobans each week than anything on the Food Network. Showcasing nutritious, affordable, delicious foods grown by Manitoba's farmers, show presenters cook and share stories and tips about choosing and preparing these locally grown ingredients.

Watch us live on CTV Winnipeg at 6:30pm - November 13 with reruns airing February 26 and March 26 or catch up on missed episodes at **GreatTastesMB.ca**.

Credit: iStock.com/Chictype

SAVE THE DATE **Manitoba Canola Growers Annual General Meeting**
February 17, 2022 | More details to come

Agriculture literacy in schools

Manitoba Canola Growers is proud to work with various partners to promote agriculture literacy in schools, including Agriculture in the Classroom – Manitoba. We have expanded our partnership recently to work with teachers Shelley Gray and Emma Rathgeber, who specialize in writing and sharing teaching resources with their fellow teachers through the Teachers Pay Teachers platform. These Manitoba curriculum-connected projects provide teachers and parents with projects that not only reinforce real-life math, social studies, English language arts and science skills, but also teach kids about the important work on farms and in agriculture.

Please visit our website at **canolagrowers.com/educational-resources** and share these FREE resources with a teacher in your community!

CALL FOR NOMINATIONS

Manitoba Canola Growers (MCGA) is seeking members to stand for election to the Board of Directors.

FOUR POSITIONS ARE UP FOR ELECTION EACH HOLDING A FOUR-YEAR TERM.

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MARKETING STRATEGY CHANGES FOR 2022

Canola Digest asks its six farmer panelists how higher crop prices over the past year and how uncertain weather and productivity in 2021 might change their marketing strategies for 2022?

BY JAY WHETTER

CODIE NAGY
OGEMA, SASKATCHEWAN

Codie Nagy didn't forward contract as much as usual heading into the 2021 growing season. Prices were moving up, "so we sat back and watched what was happening," he says.

Nagy employs the services of two separate market analysts. "They weren't giving sell signals because they felt the market still had some upside, so we waited," he says.

He was also a little apprehensive about locking in too much after an experience in 2019. "We over-contracted on durum that year," he says. "Quality wasn't good and we took it on the chin."

For this year's crop, Nagy will make most marketing decisions after harvest. "When we need to sell to pay some bills, we'll try to pick the crop with the highest price at that time."

Nagy hires market analysts for daily market updates and one-on-one conversations to answer specific questions.

"It is money well spent," he says. "They've been wrong sometimes and we've been wrong sometimes, but with every crop at or near record prices, it's nice to have extra advice to take the emotion out of the decisions."

Codie Nagy hires market analysts for daily market updates and one-on-one conversations. "It's nice to have extra advice to take the emotion out of the decisions."

—Codie Nagy

Maple Grove Colony put up two 40,000-bushel bins to increase market flexibility. "Up until this year, we had to sell canola right after harvest to make room for soybeans, then sell soybeans to make room for corn. We can now trickle it out more slowly."

—Leonard Waldner

LEONARD WALDNER
LAUDER, MANITOBA

Maple Grove Colony's marketing plan revolves around crop that is already in the bin, rather than signing contracts for crop that hasn't been harvested, or even planted, yet.

"Forward pricing is just too risky with our sandy soil," says Leonard Waldner, farm manager at the colony in southwest Manitoba.

Their strategy didn't change last winter when grain prices increased. "We didn't lock in anything except for one load. We decided to just ride out the storm, and I'm glad we did," Waldner says. Hot and dry growing conditions left many Manitoba farmers short on yield. "I have lots of friends who aren't going to be able to fill their contracts."

Instead, the colony put up two new 40,000-bushel bins to increase their on-farm storage and market flexibility. "Up until this year, we had to sell canola right after harvest to make room for soybeans, then sell soybeans to make room for corn," Waldner says. The new storage space will increase their marketing flexibility. "We can now trickle it out more slowly."

A marketing strategy built around storage is not risk-free either, especially for canola – which is prone to spoilage and heating if not cool and dry and clean. "I don't like to store canola," he says. "So we'll make sure it's in good shape going into the bin, install cables and watch it closely."

LYNDON NAKAMURA
TABER, ALBERTA

Nakamura Farms grows canola hybrid seed, potatoes, sweet corn, sunflowers and cannery peas under pre-arranged contracts. The rest of the farm is rotation crops, including spring wheat, winter wheat and dry peas. Lyndon Nakamura is in charge of marketing those crops.

"I was a little too aggressive in forward-marketing the crop still out in the field this year," Nakamura says. "I am usually around 50 per cent sold and increased that to 60 per cent this year. I sold based on last year's good results and didn't expect the unparalleled drought."

The experience taught him not to be too aggressive on selling something that isn't there. "I'm still learning," he says. "For 2022, I'll only market what I think we can get, I guess."

When forward-selling, Nakamura has been using average-price contracts to remove some of the price speculation. They worked well this year because the price kept rising. Instead of being stuck with the lower price at the time he signed the contract, his final price will reflect the steady rise through the year. "I'll probably stick with them for 2022," he says.

BRETT JANS
NEW NORWAY, ALBERTA

Brett Jans's number one strategy for hedging and risk management is to grow a variety of different crops. "My hope is that this reduces my production risk because not all of my 'eggs are in one basket' if there is a frost, insect or disease outbreak that decimates a certain crop," he says. "It also helps me to hedge against any commodities that crash or rally because I don't have a high percentage of acres in any one commodity."

Jans tries to maintain a pulse-cereal-canola-cereal rotation, with barley, wheat and oats for cereals, and peas and faba beans for pulses.


Credit: istock.com/Simon Skafar

"I was a little too aggressive in forward-marketing the crop still out in the field this year."

—Lyndon Nakamura

Two canola processing plants announced for Regina "is the best news I've heard in a long time. When you have two people competing for your grain, it is like farming in heaven."

—Roland Crowe

"As a young farmer, I don't own a lot of storage yet, so I have to move a lot of grain out at harvest to make space. Contracts to get grain moving early also provide cash flow. "Cash flow is almost my number one restriction."

—Brett Jans

When it comes to marketing tools, pre-selling is an important part of his plan. He has been pre-selling 15 to 20 per cent of his anticipated production. "As a young farmer, I don't own a lot of storage yet, so I have to move a lot of grain out at harvest to make space," he says. Contracts to get grain moving early also provide cash flow. "Cash flow is almost my number one restriction," he says.

Looking back, Jans says he probably pre-sold too much in 2020 and 2021. In 2020, excess moisture greatly reduced his overall farm productivity. "I ended up aggressively pre-sold, which drastically reduced my marketing flexibility." Then in 2021, he stuck to his 15 to 20 per cent plan in 2021 to "take advantage of what seemed at the time like phenomenal prices." But the price just kept going up. The good news is that soil moisture reserves in his area in 2021 allowed for decent yields despite the hot weather, so he has a bit of grain to sell into strong spot markets.

Jans says he will still pre-sell grain for 2022. "But after hearing of all the farmers forced to buy out contracts due to the drought or hail this year, and with the fact we were just lucky enough to avoid that, I will reduce my percentage sold going forward to max five to 10 bushels per acre," he says.

ROLAND CROWE
PIAPOT FIRST NATION, SASKATCHEWAN

Roland Crowe manages the rental agreements on 36 quarters of farm land that Piapot First Nation owns around Avonlea and on the home reserve north of Regina. He works with six "good renters."

Crop prices and yields will often factor into rental agreements.

"Yields are looking alright this year," Crowe says – even with above average heat and below average moisture. "I farmed 5,000 acres of the Avonlea land for 20 to 25 years. With three to four inches of rain we could get a crop, and anything more than that was a bonus."

The first canola to come off the land this year yielded 35 to 40 bu./ac., and prices are very good. (We talked in early September.) Crowe prefers a dollar-per-acre rental agreement over a profit-share. "Any renters prepared to pay cash per acre are serious farmers," he says.

Crowe is optimistic about canola in his area for 2022 and beyond. "Five or six inches of rain over the past week to 10 days is money in the bank for next year," he says. And two canola processing plants announced for Regina "is the best news I've heard in a long time," he says. "When you have two people competing for your grain, it is like farming in heaven."

NICOLEA DOW
PORTAGE LA PRAIRIE, MANITOBA

Nicolea Dow's market risk management is based on a diverse crop rotation, a good plan and some flexibility to change her mind.

The farm grows canola, soybeans, corn, wheat and oats. Prices were strong heading into this spring, but a shortage of moisture was evident early, so Dow decided to cut back on oat acres and replace them with wheat.

It was a good move. "Our oats were terrible and the wheat did well," Dow says.

As for capturing high prices heading into the 2021 crop year, Dow signed delivery contracts for a small amount. "I have a hard time selling more than 25 per cent of a crop that's not in the ground."

"I think our farm is better off with diverse rotations. As much as I value doing well today, I want to be able to do well in 10 years. So I don't want to be too over-reactive to the market when making my cropping decisions."

—Nicolea Dow

Dow likes to have a plan in place by around November so she can make seed and fertilizer purchases through the winter. Possible changes for 2022 are to cut back on oats and corn, and possibly add peas.

"Corn has done very well for us over the past five years, being our most profitable crop, but it tapped out this year because of low soil moisture reserves," Dow says. "If we are in a dry cycle, corn won't do as well."

For peas, the new Roquette processing plant at Portage la Prairie provides a buyer "right here on our doorstep," Dow says. And peas tend to do better in dry conditions, so she may try peas to replace some corn acres in 2022.

While peas are not a replacement for corn in a broadleaf-grass rotation, they add to the cropping diversity. "In the long term, I think our farm is better off with diverse rotations," Dow says. "As much as I value doing well today, I want to be able to do well in 10 years. So I don't want to be too over-reactive to the market when making my cropping decisions."

"Rotations help with time management, especially at harvest, and business risk management," Dow says. "They also help the land. I want to do what's best for the land."

—Jay Whetter is the editor of Canola Digest.

RISK FACTORS FOR CANOLA STORAGE

Storage may be a relatively static and controlled operation, but it still involves understanding the equipment, layout and logistics unique to each farm, and managing risk to maintain seed quality until canola is delivered.

BY TARYN DICKSON

Canola storage studies featured on the Canola Research Hub describe considerations for canola with different oil content, stored during summer or winter, in larger bins, in grain storage bags, and dried with natural air. The research described below offers the best recommendations for each of these situations.

A study titled 'Storage and handling characteristics of new varieties of high oil content canola' by Digvir Jayas out of the University of Manitoba investigated canola with low (less than 42.5 per cent) and high (about 45 per cent) oil content. The overall finding was that canola at any oil content keeps its high quality longer when stored at lower temperatures and with a lower moisture content.

Jayas also completed two consecutive studies on the 'Feasibility of bag storage system for canola under Prairie conditions' (part 1 and part 2) which determined that dry canola seeds can be safely stored for six to eight months in bags, but canola at 12 per cent moisture should only be stored in bags temporarily.

Joy Agnew's 'Determining best practices for summer storage of canola in Western Canada' (part 1) project out of the Prairie Agricultural Machinery Institute (PAMI) measured grain temperature, relative humidity and airflow rates on three 4,000-bushel, 18-foot diameter bins of canola. The study compared three different management practices – aeration, grain turning and leaving it alone – for dry canola (six per cent moisture) that was frozen over winter. The overall result:

- As winter transitions into summer, it is recommended to monitor the temperature profile in canola bins for rapid increases which can indicate spoilage and to have a plan in place to move the grain if this occurs and not to turn or aerate. As well, aerating and turning grain to warm up canola stored throughout a cold prairie winter is not necessary.

Agnew's subsequent 'Determining best practices for summer storage of canola in Western Canada (part 2)' study, utilized canola with nine per cent moisture content.

This study concluded:

- Leaving bins alone resulted in the most stable and favourable storage conditions throughout the summer months, provided the canola is dry (<10 per cent moisture content) and uniformly frozen (to less than -5°C) going into the spring months.

- Canola should be monitored frequently when it is stored to minimize the risk of grain spoilage.

On the topic of aeration, Joy Agnew and Charley Sprenger conducted the study on 'Defining best management practices for using supplemental heating with natural air drying'. One trial compared the effect of airflow rate on supplemental heating with natural air drying (NAD) compared to NAD without added heat. It used bench-scale test bins, and assessed the rate of drying with supplemental heat at three different temperature increases. Overall, supplemental heating for NAD systems was reported to be a potential lower-cost alternative to heated air drying, to extend the drying season. However, careful management is required to keep operating costs comparable to that of a dedicated dryer system.

The 'On-farm canola storage research in large bins' project led by PAMI's Lorne Grieger investigated large bins for airflow rates and static pressures from common aeration fans. It also compared airflow uniformity, and grain pressure distribution on the bin floor. The large-bin study found that airflow/static pressure recommendations developed for small bins are effective in conditioning canola for safe long term (over five months) canola storage in large bins. However, the fan requirements and grain monitoring practices may need to be adapted for larger bins.

Full reports for these studies have more detail. To find these reports and video interviews with the lead researchers, please search the Canola Research Hub at canolaresearch.ca.

—Taryn Dickson is resource manager for Crop Production and Innovation with the Canola Council of Canada.

To find fully detailed reports and video interviews with the lead researchers, please search the Canola Research Hub at **canolaresearch.ca**.

Global demand for vegetable oils, including Canadian canola, remains strong. Meanwhile, supply outlook for vegetable oil and oilseed crops is good, despite production challenges in Canada in 2021.

CANOLA MARKET SNAPSHOT

It came as no surprise to anyone in Western Canada when September reports from Statistics Canada and the United States Department of Agriculture (USDA) predicted a big drop in Canadian canola production after drought and heat took down yields.

Statistics Canada's mid-September update reduced its canola forecast to 12.8 million tonnes for 2021. The yield estimate was 25.3 bu./ac., which is well below the average of just over 40 bu./ac. for the previous five years.

The USDA, in its September Oilseeds: World Markets and Trade report, estimated Canadian canola production at 14.0 million tonnes. The October report will likely have a lower number.

Meanwhile, canola/rapeseed production for the rest of the world was holding on. USDA estimates for all other canola/rapeseed (simply "canola" from here on) production areas around the world are flat to up slightly. While its Canadian estimate is down almost seven million tonnes from the year before, USDA shows a 1.5 million tonne increase for everywhere else. Production for other oilseed crops is also up.

GLOBAL OILSEED PRODUCTION

The USDA, in the same September report, estimated global 2021-22 oilseed production at 629 million tonnes for the eight major oilseed crops. This is up from 601 million in 2020-21. Soybeans, up 20 million tonnes year over year, account for most of the increase. The rest comes from sunflowers, up seven million tonnes to a forecast 57 million. All other major oilseeds are up slightly. Only canola supply, at 68.2 million, is down.

Production of major vegetable oils, a list that also includes palm, is at 215.4 million tonnes in the USDA September report. This is up eight million from 2020-21. Palm oil accounts for 3.5 million of that gain.

WHERE TO NEXT?

While Canadian canola production had a tough year, all is not doom and gloom. Announcements of three new canola processing plants and the doubling of a fourth in Saskatchewan point to confidence in Canadian canola to get supply back on track – once the weather cooperates. These companies expect canola oil demand to increase substantially, driven by growth in global vegetable oil consumption and by pending biofuels policies in the U.S. and Canada.

The world may need an increase in Canadian canola production to address potential supply issues elsewhere.

Each year, the Organisation for Economic Co-operation and Development (OECD) and the Food and Agricultural Organization (FAO) of the United Nations collaborate on an agricultural outlook for the coming decade. The 2021 outlook, which looks ahead to 2030, includes a chapter on oilseeds and oilseeds products.

The report notes that while global palm oil output has outpaced the production of other vegetable oils over the past decade, "growth in the production of palm oil is expected to weaken due to increasing attention

To find the reports mentioned in this article:

Look up "Production of principal field crops" at: **statcan.gc.ca**

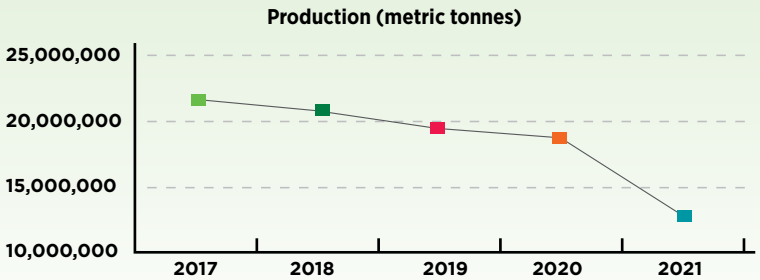
Look up "Oilseeds: World Market and Trade" at: **fas.usda.gov**

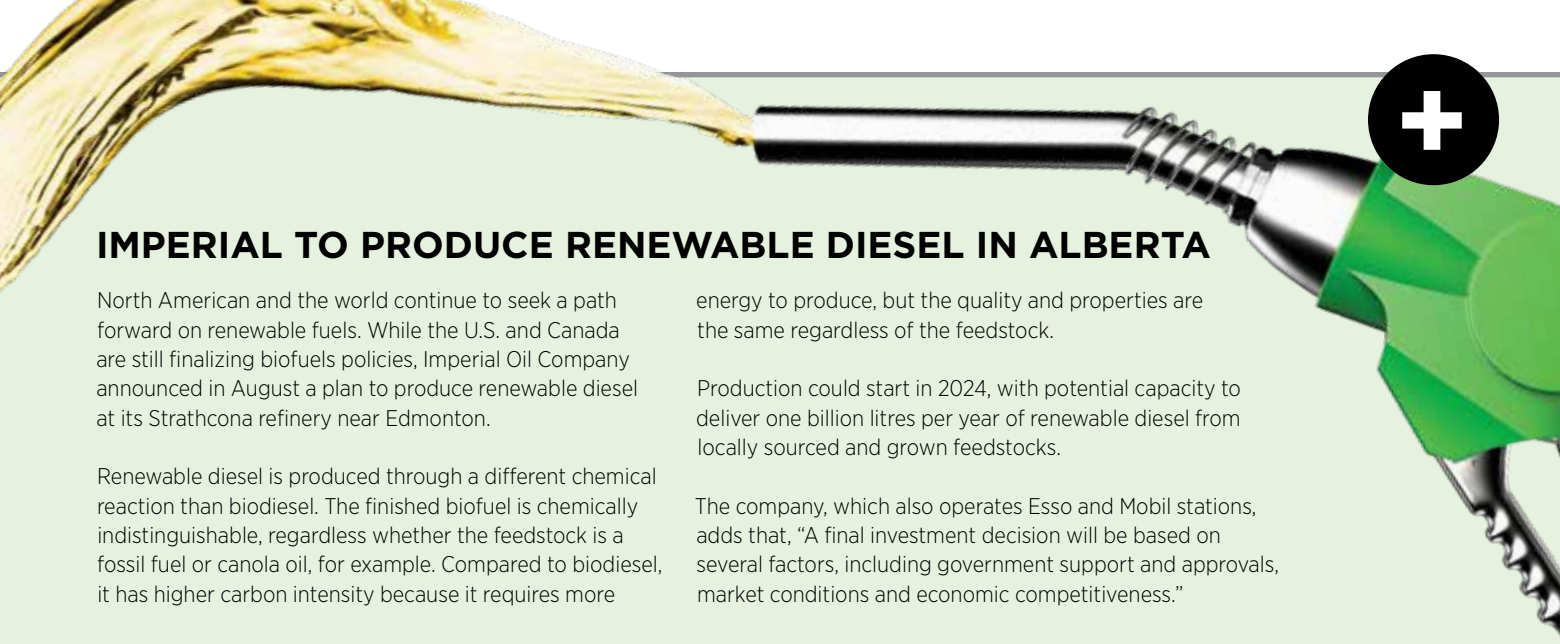
Look up "OECD-FAO Agricultural Outlook 2021-2030" at: **oecd-ilibrary.org**

FIVE-YEAR TRENDS

Canadian canola production took a big hit in 2021. Harvested area was up, but drought and heat reduced yield to a level not seen since 2005. Find more stats at **canolacouncil.org/markets-stats**

Source: Statistics Canada, September 14 report.





IMPERIAL TO PRODUCE RENEWABLE DIESEL IN ALBERTA

North American and the world continue to seek a path forward on renewable fuels. While the U.S. and Canada are still finalizing biofuels policies, Imperial Oil Company announced in August a plan to produce renewable diesel at its Strathcona refinery near Edmonton.

Renewable diesel is produced through a different chemical reaction than biodiesel. The finished biofuel is chemically indistinguishable, regardless whether the feedstock is a fossil fuel or canola oil, for example. Compared to biodiesel, it has higher carbon intensity because it requires more energy to produce, but the quality and properties are the same regardless of the feedstock.

Production could start in 2024, with potential capacity to deliver one billion litres per year of renewable diesel from locally sourced and grown feedstocks.

The company, which also operates Esso and Mobil stations, adds that, "A final investment decision will be based on several factors, including government support and approvals, market conditions and economic competitiveness."

to sustainability concerns and the aging of oil palm trees in Indonesia and Malaysia."

The OECD and FAO report also expects limited growth for major canola producers China and the European Union "as relatively higher prices for cereals are expected to generate strong competition for limited arable land." They give Canada an oilseeds production figure of 23 million tonnes by 2030, which is decent growth but probably conservatively low. The Canola Council of Canada strategic goal is to reach 26 million tonnes by 2025. With co-operative weather and current acreage levels of around 22 million, this target is achievable. (The Canadian record is 21.5 million tonnes of canola, set in 2017.)

The report adds that Ukraine and Russia, which continue to put more arable land into production in the Black Sea region, could also see strong growth in oilseeds production.

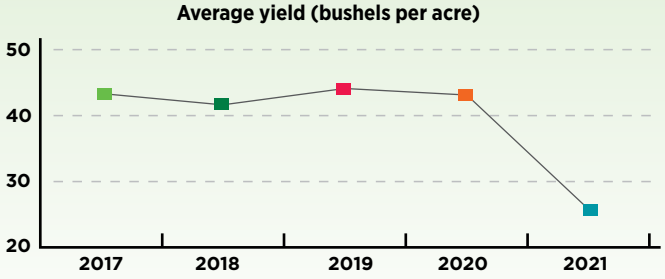
All in all, the OECD and FAO report projects that global demand for vegetable oil will expand by 33 million tonnes by 2030.

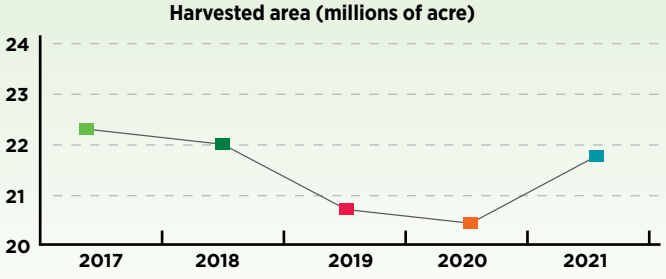
MAJOR VEGETABLE OILS: WORLD SUPPLY (USDA) *(Million tonnes)*

VEGETABLE OIL SOURCE	2017-18	2018-19	2019-20	2020-21	2021-22*
COCONUT	3.56	3.64	3.49	3.44	3.56
COTTONSEED	5.10	4.97	5.15	4.81	5.04
OLIVE	3.29	3.17	3.12	2.92	3.28
PALM	70.46	74.12	72.95	72.91	76.52
PALM KERNEL	8.25	8.59	8.53	8.41	8.79
PEANUT	5.88	5.88	6.24	6.41	6.48
CANOLA/RAPESEED	28.00	27.72	28.02	29.11	27.73
SOYBEAN	55.16	56.03	58.54	59.74	61.68
SUNFLOWER	18.61	19.62	21.24	19.28	22.10
TOTAL	**198.29**	**203.74**	**207.28**	**207.01**	**215.36**

* 2021-22 numbers are based on the USDA September 2021 forecast.

Data from the United States Department of Agriculture's Foreign Agricultural Service ("Oilseeds: World Markets and Trade", September 2021) show a continued and steady increase in global vegetable oil production. The Organisation for Economic Co-operation and Development (OECD) and the Food and Agricultural Organization (FAO) of the United Nations, in a 2021-30 forecast, project global demand for vegetable oil will expand by 33 million tonnes through this decade.





Merit Functional Foods of Winnipeg has supply agreements with Nestle, TWC Nutrition, Daiya Foods, Grand River Foods and many other food and beverage companies to create products containing canola protein. Sidebars describe new opportunities for canola in fish alternatives and aquaculture feed.

MARKET BUILDS FOR CANOLA PROTEIN

BY TREENA HEIN

A number of projects are underway to use canola protein in exciting new food and feed ingredients, several of them involving Merit Functional Foods and supported by supercluster funding agency Protein Industries Canada (PIC). Merit's plant-based food ingredient development, according to PIC, "represents a significant step forward not only in Canada's intellectual property potential, but also the country's ability to utilize its diverse crop selection in new ways that prioritize consumer health and taste."

Indeed, research firm Reports And Data projects the annual compound growth rate for the global canola protein market to be 7.8 per cent, with a projected market value US$3.28 billion in 2027.

This is partly because, as noted by Transparency Market Research, canola protein contains all the amino acids required by the human body and is therefore a highly-valuable 'complete' protein source. Manufacturers of canola proteins therefore have lucrative opportunities, especially if they can emerge as market leaders now, as Merit is doing. At this point, states the research firm, "despite years of research on canola proteins," and the "various procedures and technologies that have been developed...still, there are very few canola protein-incorporated products available in the market."

These pancakes are made with Merit's Peazazz pea protein and Puratein C canola protein.

Credit: Merit Functional Foods

Merit recognizes that previous attempts to extract protein from canola have resulted in dark and bitter products. However, its proprietary technology produces 'clean' protein ingredients with a neutral flavour profile as well as excellent solubility and stability over a range of pH levels. "Typically, there have been challenges with taste, texture and nutrition," explains Tara Kozlowich, Merit Functional Foods vice president of marketing. "But now, with Merit's proteins, the taste, texture and fortification limitations of plant-based products is no longer a concern."

MERIT PRODUCTS

Merit's plant in Winnipeg is the first commercial facility in the world capable of producing food-grade canola proteins. It produces a variety of ingredients that can be included in beverages, yogurts, and meat and cheese substitutes. Among them are several Puratein ingredients. Puratein C is a highly-soluble ingredient with over 90 per cent protein and a high level of the amino acid cysteine. This makes it suitable for protein fortification purposes, as well as rounding out the amino acid profile in various products.

Puratein G has a savoury flavour with functional properties important to meat alternative formulations such as gelling, binding and emulsification. Puratein HS is a light colour powder with a mild flavour,

Credit: istock.com

Canola protein-based 'whole muscle' fish filets are currently in development.

exceptionally high purity level and over 90 per cent protein. It displays excellent solubility across the pH range, and possesses a very good foaming and whipping capacity that exceeds performance of egg albumen. It's also high in cysteine.

In addition, Merit (with the support of PIC and in partnership with Pitura Seeds and Winning Combination) is using Burcon's patented technology to create new food and beverages that feature blended non-GMO canola-yellow pea protein called Peazazz and Peazac. In terms of volumes, Kozlowich says "we expect to process 25,000 tonnes of peas and/or non-GMO canola per year, with the flexibility to use either one. Our demand in 2022 and beyond is planned to exceed more than 100,000 tonnes per year."

Working with Nestle, Burcon and Merit will tailor and produce their canola protein ingredients for use in a range of alternative products to meat and dairy. Merit also entered into a partnership with Bunge in 2020, where Bunge invested in Merit to allow both companies to mutually meet the growing demand for plant-based products.

In May 2021, Merit announced another project. Supported by PIC, Merit, TWC Nutrition, Daiya Foods and Grand River Foods will use Merit's pea, canola and pea-canola blended protein ingredients in new plant-based foods and beverages.

Many other leading brands are using or plan to use Merit's ingredients, but Merit is unable to share their names. "That said, we have upwards of 350-plus non-disclosure agreements ranging from small to larger consumer packaged goods companies that are finding great success in using our proteins," says Kozlowich. "We are currently exporting proteins globally, as many game-changing brands are located not only in Canada but all across the world."

She notes that opportunities are strong because consumers are looking for plant-based protein innovation in categories across the entire food and beverage spectrum, from ice cream and meat alternatives to bakery and beyond. "Innovation in the plant-based space is not isolated to any one category," she says. "Rather, as consumers' tastes and their protein expectations for plant-based applications rise, new ingredients such as canola protein are making products taste and function better with just as impressive nutritionals as their traditional counterparts."

"We are excited for the future," Kozlowich says. "Although we can't get into specifics, there is so much opportunity in 'plant based' and we are so proud to be a part of this industry."

—Treena Hein is an award-winning science writer and educational resource consultant.

"We have upwards of 350-plus non-disclosure agreements ranging from small to larger consumer packaged goods companies that are finding great success in using our proteins."

—Tara Kozlowich, Merit Functional Foods

A canola 'fish' filet

In June 2021, Protein Industries Canada announced a co-investment with Ontario companies New School Foods and Liven Proteins to develop plant-based seafood products. The companies are testing canola protein and other plant-based proteins with a focus on developing a 'whole muscle' plant-based fish filet that offers the same texture, taste and cooking experience of fish. There are already canned and fish stick-shaped plant-based fish products available from retailers across Canada, but none yet available in the form of a whole unbreaded filet, nor any that offer a texture as flaky as fish. Therefore this product, when commercialized, will provide consumers with a vegan product that more accurately mirrors actual seafood. Read more at **proteinindustriescanada.ca/news**.

Botaneco canola aquaculture feed ingredient

With Corteva Agriscience Canada and Rowland Farms, Alberta-based Botaneco has successfully trialled a canola protein ingredient in feed for aquaculture species. Tested at the Centre for Aquaculture Technologies in Prince Edward Island, Botaneco's canola ingredient has 75 per cent protein content and, in salmon, has showed excellent feed acceptance, growth and weight gain. It has also been tested in shrimp. Overall, the ingredient has been shown to be one of the most effective plant-based proteins ever developed for use in aquaculture feed. Botaneco developed the ingredient as part of a co-investment project announced by Protein Industries Canada in June 2019.

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After the summer drought and drop in crop productivity in 2021, canola farmers may be reviewing their business risk management (BRM) program. This article describes how FMC's AgriShield can help farmers work through a comprehensive approach to manage farm risk.

What BRM tools are right for you?

BY MATHIEU LIPARI

What are the options for business risk management? And do you need them all?

Before we get started on this topic, let's begin by asking ourselves: What we are talking about when using the term "business risk management (BRM)"?

In many circles, BRM strictly refers to government risk management programs, more specifically AgriInsurance, AgriStability, AgriRecovery and AgriInvest. Although these programs can be a very useful and, for some, a critical part of managing farm risk, BRM encompasses a much broader repertoire of activities.

A report released by the Organisation for Economic Co-operation and Development (OECD) in 2011 noted, "In many cases, public farm support programs have crowded out other ways to manage risk."

Research recently conducted by Farm Credit Canada (FCC) and Farm Management Canada (FMC) support this observation. Approximately 30 per cent of farmers have a risk management plan of some type, typically limited to financial and production risk. Why so low? Many of those who don't have a risk management plan believe it is unnecessary and feel that their farms are succeeding without one.

So, answering the question "What BRM tools are right for you?", becomes more complex as we rethink and redefine BRM. But this is a necessary step in managing farm risk.

In its simplest form, risk is defined as the uncertainty of an outcome. Insurance and government programs typically focus on coping with the negative impacts of risk once a risk has become a reality. On the other hand, BRM is about thinking strategically and applying a process to minimize threats in advance while putting yourself in a position to seize new opportunities presented by changing circumstances. The latter does not exclude the former and it's best to have both approaches included in your BRM plan.

For the purpose of this article, BRM refers to everything a farmer needs to consider and do to manage risk. This includes prevention, mitigation and management. In other words, proactive planning to manage both what is in the farmers' control and outside the farmers' control. More concretely, BRM should involve a plan to manage risks that can affect the people on your farm (including issues with farm safety, personal well-being, employees, family relations, and contractors/advisors), your finances (issues with financial management and investments), the markets (issues with sourcing, pricing, selling and trade), the strategic management of your farm (issues with your business strategy, technology, farm transition, and operations), your business environment (issues with public trust and consumer advocacy, and politics, policy and regulations), and your production (issues with climate and environment, animal health and welfare, nutrient management, pest management, and soil, water and biodiversity).

At first glance, this may seem overwhelming. That's a lot of ground to cover. The good news is, farmers can gain more control over many of those risk by applying proven business practices at little to no cost. It's about a change in management practices and a mechanism to evaluate risk and putting practices in place to gain control over risk. Sure, we can't help the weather or prices, but farmers can help mitigate these risks through water retention or release methods, emergency preparedness, storage, and forward contracting to support selling at more favourable prices, to give a few examples.

It could be argued that BRM is becoming more and more important. With increasing risks like extreme weather conditions, or the large number of older farmers that haven't planned for succession, or the dwindling number of farm workers, as well as emerging risks like those caused by COVID (reliable supply chains, transportation, processing, workforce and consumer protection), it's becoming more and more important to ensure that farms are resilient and capable of facing risks, not only to survive but also to benefit from opportunities presented by change.

Mathieu Lipari is a program manager with Farm Management Canada. Find out more about FMC at fmc-gac.com.

How can farmers possibly eliminate every risk that's out there without breaking the bank or going crazy with the sheer amount of work involved?

The answer is simple: They can't.

So how can farmers possibly eliminate every risk that's out there without breaking the bank or going crazy with the sheer amount of work involved? The answer is simple: they can't. Fortunately, that's not the point of BRM. What's important is to think strategically about the risks that pose the greatest threat to your farm and build a plan that puts you in the best possible position to thrive.

A COMPREHENSIVE APPROACH USING AGRISHIELD

Taking a comprehensive approach to managing farm risk is key. The approach is straightforward: (1) identify the risks that are relevant to your farm, (2) assess the activities you have in place to manage these risks, (3) identify the risks that require better management and (4) develop a plan to improve your risk management practices.

FMC's AgriShield (myagrishield.ca) is an online platform that facilitates this process.

You begin by answering some simple questions about the frequency or likelihood of a risk occurring, and the impact it would have on your farm if the risk became a reality. Then the platform prompts you to answer more specific questions, including the best practices you have in place to reduce these risks. Once that's done, you can use a built-in action planning tool to decide what actions you want to take to better manage your risks.

Many best practices can be adopted for little or no cost, and these can greatly improve your farm's resilience.

For example:

- Do you hold regular meetings with your staff/partners/family/board of directors to discuss your farm's values/objectives (short and long term)/strategy?
- Do you have standard operating procedures on your farm?
- Have you trained your staff on farm safety?
- Have you started talking about farm succession? (Who? When? How?)
- Do you have contracts with suppliers and buyers, or do you rely on handshake agreements?
- Do you use forward contracts for selling your products?
- Do you have an environmental farm plan?

AgriShield also includes resources and programs to help you take action to reduce your risks or mitigate the impact, including subscribing to government support and insurance programs.

Aside from online risk management tools, training programs can help you to understand and apply comprehensive (or whole farm) risk management. A program led by FMC, and funded by the Government of Canada's AgriRisk Initiatives, called Roots to Success is currently being offered. The program takes farmers through comprehensive risk management planning, and for now, it's completely free. Participants in the training also gain free access to AgriShield.

Finally, many websites offer information about risk management. AgriResponse.ca provides a forum to ask questions about specific risks and management strategies, and also posts articles on recent risk management topics for farmers to consider when creating and updating their risk management plan.

Our farm management decisions and process for making informed decisions are now more critical than ever. An immense opportunity for growth for the Canadian agricultural sector will come from shifting attitudes towards risk management beyond government support programs.

The Next Policy Framework provides a significant opportunity to redefine business risk management and recognize that taking a comprehensive approach to managing farm risk is the best way for farmers to manage that which is in their control, use the appropriate tools to manage that which is outside of their control, and continue to invest in what works.

The time has come to redefine business risk management and take a comprehensive approach to manage farm risk.

BRM RESOURCES – EXPLORE THE LINKS BELOW

Through Farm Management Canada's AgriShield platform, farmers can work towards creating a comprehensive risk management plan for their farm.

www.myagrishield.ca

Through the AgriResponse website, Farm Management Canada provides a forum to ask questions about risk management in agriculture and publishes articles on emerging risks and management strategies.

www.agriresponse.ca

Farm Management Canada has recently completed a rewrite and digitized version of Dick Wittman's Building an Effective Farm Management System Guidebook and Farm Management Manual. It's considered the bible for helping farmers treat their farm like a business and put the practices and policies in place to manage farm risk.

https://wittmanconsulting.com/product/building-an-effective-farm-management-system

Hey chefs,

what are customers asking about your ingredients?

Chefs are the masters who take raw ingredients and create amazing food. They are at the front lines when people have questions about food and about the farmers who produce the ingredients. Chefs can help tell your story.

BY JAY WHETTER

ELIA HERRERA

"All the oil that I use is canola oil."

—Elia Herrera

Elia Herrera runs Colibri taqueria restaurant in Toronto and is the menu and theme consultant for a new restaurant, Tatemado, in Edmonton.

"All the oil that I use is canola oil," Herrera says. She likes the high smoke point, which means the oil doesn't burn at high frying temperatures. "This is healthier for us." She also says the mild flavour of canola oil doesn't change the flavour of her dishes.

Herrera grew up in the city of Veracruz, Mexico. Her grandmother was a chef, and she fried with canola oil and pork fat. So canola oil is a natural choice for Herrera in her Canadian restaurants.

When it comes to questions about her food, Herrera says, "I don't get a lot of questions about the oil, but it is very important. People usually ask about the corn. Mexican cuisine is built around corn."

Traditionally, Mexican cooks would prepare corn with alkaline to remove natural toxins and make the corn meal – called "mixtamal" – easier to digest. They used charcoal for centuries, then switched to lime. Herrera now uses calcium to get that same easy-to-digest texture that people expect in traditional Mexican corn tortillas. Colibri sources dry food-grade corn from Ontario.

The name Colibri is Spanish for hummingbird, and the word has deep spiritual roots for Mexicans. In Mayan language, colibri means messenger and for the Aztecs it also meant warrior.

"I'm a warrior," Herrera says. "My grandmother taught me to be a strong, independent woman. She is my inspiration and, for her, I won't give up."

Herrera trained at the Culinary Institute of Mexico. While at a training stage in Spain, a friend from the Culinary Institute invited her to a class reunion in Toronto. She attended and decided to stay for a year. She has now been in Canada for 17 years. "I kept following the opportunities."

Herrera connected with Canola Eat Well on a cooking demonstration in Toronto five years ago. She made tortilla soup and churros with a group of women, including food bloggers and dietitians.

JOHN HORNE

"I never had another issue with ingredients not being respected. And it made me realize the importance of showing staff and guests where their food comes from. You have to have those conversations to show what our amazing farmers are doing for us."

—John Horne

John Horne is executive chef with Oliver & Bonacini, overseeing nine locations, including Canoe and Auberge du Pommier restaurants in Toronto.

Horne took part in a documentary called "Before the Plate," which followed 10 ingredients back to the farms that produced them. The film caught the eye of Canola Eat Well staff. Horne attended the Canola Eat Well Harvest Camp in Manitoba in 2019 and has been the guest chef at Canola Eat Well learning workshops in Toronto. "The camp was amazing," he says. "We travelled around meeting farms and learning about so many things – not just canola."

The common customer question these days is about prices, Horne says. "Supply isn't there to keep up with demand, and prices are going through the roof," he says. Beef, for example, has doubled in price since the start of the pandemic. Horne has two approaches to make this work for the business. First, he has to keep high-end steaks on the menu, so customers simply have to pay the higher price. Second, he gets creative with cuts he doesn't usually use – like flank, skirt and "coulotte" (top sirloin) steaks.

"Coulotte has great flavours," he says, "but it has a big fat cap and can be tough." One preparation Horne uses is to sear the coulotte, then slow poach it in flavoured canola oil.

"Margins in the restaurant business are always very tight, but now more than ever, we have to be creative to make a buck," he says.

A big part of Horne's job at O&B is to keep everyone inspired, keep up with or stay ahead of trends, and help chefs find the best ingredients.

"I use canola oil in every one of our restaurants and at home, and I did this before I made the connection with Canola Eat Well," Horne says.

When Horne was chef at Canoe restaurant, a high-end Canadian-inspired restaurant, his goal was to make every dish as Canadian as possible. So he looked for a canola oil that would allow him to take olive oil off the menu. He found what he needed from Ontario farmer Jason Persall, who runs Pristine Gourmet, a maker of cold-pressed oils. "The colour of cold-pressed canola oil is outstanding," Horne says. "We just went wildfire with that oil in our menus."

One example was a soup made from artichokes and pork belly, and drizzled with cold-pressed canola oil. "The canola oil brought out different flavours in the soup, like a fine wine does for food," he says. It inspired many conversations with customers. "I would go out into the restaurant and talk with tables about that dish and that oil," he says.

Horne likes to make a connection with his guests, to talk about the food, and show respect for the ingredients. While chef at Canoe, he was "over the moon" when he found some Canadian-grown salad greens that were of the type and quality he used while a chef in France. "I put these salad greens all over the menu." Then one day he found a tub of the greens wilting in the fridge, and it broke his heart.

"I blamed myself for letting that happen. So I rented a bus and rounded up 40 sous chefs, cooks and serving staff and we drove to the farm to see how the greens are grown," he says. They spent three hours in the gardens, pulling weeds, picking greens and gaining an appreciation for the work involved in growing food.

"That was an a-ha moment for me and my staff," he says. "I never had another issue with ingredients not being respected. And it made me realize the importance of showing staff and guests where their food comes from. You have to have those conversations to show what our amazing farmers are doing for us."

In August, Canola Digest editor Jay Whetter visited Oliver & Bonacini Café Grill on Front Street in Toronto. He ate an appetizer of Korean fried cauliflower (above) and a main course of old-school fried chicken. Both dishes were fried in canola oil. Executive chef John Horne works with nine O&B restaurants, and he uses canola oil in all of them.

EVA CHIN

Chef Eva Chin just joined Avling, a "farm to table" restaurant in Toronto. The restaurant has a close connection to its ingredient supply chain, and prepares dishes with a mind to increase food security and reduce waste. Avling has a 100-square-foot garden on the roof, and everything from that garden ends up on the menu. They also butcher whole animals on site, using all parts in the menu. Anything compostable goes back into the roof-top garden.

Avling's roof-top garden.

Chin was born and raised on her grandmother's farm in Hawaii, and has Hawaiian, Singaporean and Chinese heritage. Chin advocates for Chinese cooking, and promotes the Chinese Restaurant Awards in B.C. That is how Canola Digest connected with Chin. Canola Eat Well sponsors a critics' choice award for the Chinese Restaurant Awards, and Rae Kung, managing director of the awards, recommended Chin for this article. "Chef Eva Chin is our star chef ambassador in Canada," Kung says.

But while these roots influence Chin's cooking, Chin says a restaurant should go beyond its nationality.

"For too long, restaurant themes had to be geographic – Italian, Chinese, Scandinavian, etc," Chin says. (Avling is a Norwegian word meaning "crop".) Chin prefers restaurant themes that consider food security, reduced waste, local supply and diversity. "We need diversity in our diets, our crops and our land."

Chin has regular conversations with restaurant guests, and remembers one recent question about cold-pressed canola oil. Chin likes to cook ceviche and crudo – dishes that combine raw seafood with an acid like vinegar or lime juice, along with flavourings like peppers and oils. A customer eating ceviche with drizzle of cold-pressed canola oil, which Chin likes for its "nutty, aromatic flavour", was concerned that it was peanut oil. The person had a peanut allergy. Chin had to assure the person that the nutty-tasting oil was actually canola oil.

Chin also uses canola oil in baking to reduce the amount of butter, and in emulsions like vinaigrettes and mayonnaise.

Close connection to the ingredients is part of Chin's community-minded approach to cooking. "I want to run a restaurant that people visit regularly, not just for special occasions. I want it to be part of the community."

Canola Eat Well, a partnership of Manitoba Canola Growers, SaskCanola and Alberta Canola, relies on these connections to tell the story of canola and Canadian canola farmers. Chefs like Chin, Horne and Herrera want to talk about their ingredients and where they come from. Next time you're in a restaurant with a chef, let them know that you're a farmer and you like their food. It could make their day.

—Jay Whetter is the editor of Canola Digest.

Chin uses canola oil in baking to reduce the amount of butter, and in emulsions like vinaigrettes and mayonnaise.

"We need diversity in our diets, our crops and our land."

—Eva Chin

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After a year of lower-than-average yields – including extremely disappointing yields in some areas – everyone wants an increase in 2022. More than that, they want to increase profitability, especially under weather stress. This article will talk about fertilizer practices that can increase profits, reduce risk and potentially increase yields.

HOW TO INCREASE YIELD WITH FERTILIZER

This is the second article in a four-part yield series for the Canola Digest 2021-22 season.

BY JAY WHETTER

Fertilizer is the top input cost for canola production in Canada. After 2021, the fertilizer conversation on many farms could be less about "adding costs" for 2022 and more about "managing risk". This article will look a few key ways to manage risk, and explain how those steps could also increase profitability and productivity.

Jenneth Johanson had "half a canola crop" on her farm at Lac du Bonnet, Manitoba in 2021. Immediately after wrapping up canola harvest August 26, Johanson took soil samples because she was going in with fall rye and wanted to know the residual nutrient situation. One field had 122 lb./ac. of nitrogen. Another had 76 lb./ac. "Those numbers are pretty high," says Johanson, but they were not unexpected.

When farms get half a crop, as many did in 2021, soil tests can save a lot of money next year because they show how much nutrient is left in the soil, bought and paid for. Soil tests will show how much nutrient is left in the soil and determine how much fertilizer farms can remove from their 2022 crop budgets.

John Heard, crop nutrition specialist for Manitoba Agriculture and Resource Development, always encourages farmers to get soil tests, "but especially this year."

November can be a good time to collect soil tests in preparation for spring application. Sampling after soils have cooled to at least 10°C helps reduce nutrient content changes due to microbial activity that may occur prior to seeding next spring. (For more tips, read the article "Use soil tests to take advantage of a challenging year" on page 29 .)

REDUCE LOSSES, IMPROVE PROFITS

One way to improve profit per tonne of fertilizer is to make sure more of that fertilizer ends up in the crop, with less lost to weeds, air and water.

Johanson has adopted a few fertilizer management practices aimed to lower risks while also maximizing potential returns.

One is split application. Johanson will apply about half the soil-test-recommended nitrogen rate at the time of seeding and top-up with the other half in season – if conditions support it.

She started the practice in response to extremely wet years in the 2000s. "I used to put the full rate on at the time of seeding, but then canola would drown out and we'd lose a lot of nitrogen to weeds and denitrification," she says.

Johanson uses liquid urea ammonium nitrate (UAN) with N-Forced stabilizer, a urease inhibitor similar to Agrotain. She applies the first 50 per cent of UAN just before seeding, dribbling it on with the high-clearance sprayer. She'll go over it with a light harrow or, if rain is forecast, just leave it. The stabilizer reduces the risk of loss while waiting for that rain to move fertilizer into the soil.

"This would have been a good year to stick with our usual plan, because we would not have applied the other 50 per cent had we waited until bolting."

—Jenneth Johanson

"Then we watch the weather," she says. If canola gets well established and yield potential looks good, she'll apply the other 50 per cent of fertilizer just prior to bolting.

In 2021, Johanson modified the practice somewhat because the year started off so promising. She seeded canola the first week of May then, with a forecast for good rain on May long weekend, top-dressing the remaining nitrogen on May 18. The farm got 2.5 to three inches of rain on May 22, which moved fertilizer into the soil. By June 13, the growing season total was 5.5 inches – then it didn't rain again for 60 days.

"This would have been a good year to stick with our usual plan, because we would not have applied the other 50 per cent had we waited until bolting," Johanson says. "But you make the best decisions based on information you have at the time."

Even if 2021 didn't work out as Johanson planned, Heard says her combination of stabilizers to reduce losses and split applications to align

rates with yield potential are two effective ways to reduce risk and improve the return on investment for fertilizer.

Stabilizers include urease inhibitors, nitrification inhibitors and controlled-release nitrogen. Urease inhibitors slow the hydrolysis of urea in to ammonium. Urease inhibitors like Agrotain with fall-banded urea may slow the release of ammonia and its subsequent conversion to nitrate, reducing the risk of nitrate leaching or denitrification. Nitrification inhibitors like N-Serve, Centuro or eNtrench keep nitrogen in ammonium form for longer, reducing the concentration of nitrate in the soil solution. This reduces the risk of leaching, denitrification and nitrous oxide emissions. Benefits are greatest in wet soils where potential losses through leaching and denitrification are high. The product SuperU has both urease and nitrification inhibitors. Controlled-release nitrogen sources like ESN provide the greatest benefit under warm, moist conditions that promote high loss. Benefits increase if fertilizer is in the soil for an extended time before crop uptake, say with early fall application.

"The gold standard," Heard says, is to band all nutrients at the time of seeding, placing most of it outside the seed row. "You can't improve on the one-pass systems common in Alberta and Saskatchewan," he says. But if crop faces fairly regular establishment risks, like frost, flea beetles or excess moisture, the split application is a good option to reduce risk and loss.

MOVE TOWARD VARIABLE RATE PRACTICES

"The beauty of 4R is the flexibility to get the job done," Heard says. The 4Rs of nutrient management are "Right Source at the Right Rate, Right Time, Right Place". As growers adopt and then enhance their 4R nutrient management, one advanced practice is variable-rate application.

Jenneth Johanson follows various 4R practices on her farm at Lac du Bonnet, Manitoba. These include soil sampling. After "half a crop" in 2021, Johanson soil sampled to get a handle on residual nitrogen. One field had 122 lb./ac.

The Canola Council of Canada surveyed 1,000 canola growers last winter, and results showed that top-yielding growers are more likely to use variable-rate fertilizer application. However, overall usage is still low – with only 11 per cent of farmers surveyed saying they apply at variable rates.

Newer seeding tools are equipped to apply variable rates of fertilizer (and seed), so many farms have the machinery to do it. The bigger job is to create variable-rate maps that guide the machine. Fields maps are divided into management zones, often based on soil characteristics, drainage or elevation. These maps can take some time and practice to get right. In the meantime, farmers have a few simpler methods to get started on variable rate.

Wes Anderson, vice president of agronomy for Croptimistic Technology, says a quick start would be to shut off fertilizer application in saline patches. "These areas often won't benefit at all from more nutrients and they're super easy to map out," he says.

Another relatively easy step, Anderson says, would be to increase sulphur rates on the hilltops – areas with low organic matter and sandier soils where sulphur deficiency tends to show up. "This is low-hanging fruit," he says.

John Heard says a logical and economical step is to vary the source, not the rate. "Put NServe treated anhydrous ammonia in those low-landscape positions that tend to be wetter and higher risk for loss, then switch to regular nitrogen for well-drained upper slopes where there are no losses."

For anyone buying a new seeding tool, Anderson recommends they look at the variable-rate options it provides. This is where 4R will really start to show results, he says. "If all you do is soil sample or just focus on variable-rate nitrogen – not other nutrients, you're missing out on huge opportunities to get at the true benefits of 4R."

Warren Ward, agronomy specialist with the Canola Council of Canada, wants to see widespread adoption of 4R practices that at least match the needs of individual fields, if not zones within fields. "If fertilizer blends specific to each field are not logistically possible, apply the blend at different rates to match the yield goal for each field," Ward says. "This winter, I'd encourage farmers at least look at variable-rate options to see how they could improve nutrient use efficiency and profits across the farm."

RIGHT RATES FOR ALL NUTRIENTS

Many canola farmers could increase yields with higher fertilizer rates – at least in years with average or better-than-average weather.

The CCC grower survey found that top-yielding canola growers use more fertilizer, especially nitrogen. (See the survey summary article on page 28.) However, survey participants said that one of their biggest barriers to canola profitability is fertilizer cost. Participants also listed drought as a major risk factor, so pushing rates may not be the right move after the experience in 2021.

When it comes to increasing yields, rates are "brute force," says Heard. He'd rather see increased use of other 4R practices to increase nutrient use efficiency and get more out of the rates farmers are already using.

Nitrogen rate calculators will often base rates on the maximum

"This winter, I'd encourage farmers at least look at variable-rate options to see how they could improve nutrient use efficiency and profits across the farm."

—Warren Ward

economical rate of nitrogen (MERN). In that scenario, the calculator will recommend a rate where the last $1 of fertilizer applied will return $1 of yield. All fertilizer applied before that point is profitable and all fertilizer applied after that point is not profitable – based on the estimated yield situation. If that 1:1 ratio seems too risky, such as with dry subsoils, farmers may want to dial back rates to where they get $1.25 or $1.50 worth of crop for that last $1 of fertilizer.

Another consideration is other yield-limiting nutrition factors. It may not be nitrogen. Anderson noted earlier than sulphur can be a limiting factor, especially on hill tops. Phosphorus has reached critical levels in a lot of fields. And fields showing potassium deficiency symptoms in cereals may soon start to show deficiency symptoms in canola.

This brings us full circle back to soil tests. "Soil tests are the foundation of 4R," says Ward. "As farmers find ways to reduce losses, increase nutrient use efficiency, apply variable rates and improve yields, a proper set of soil tests will be the foundation for all of those decisions."

—Jay Whetter is the editor of Canola Digest.

For soil sampling tips, information on nitrogen stabilizer products, and much more, please read the Fertilizer section at **canolaencyclopedia.ca**.

CCC GROWER SURVEY – FERTILIZER HIGHLIGHTS

The Canola Council of Canada surveyed 1,000 canola growers during the winter of 2020-21. The survey checked in on a wide range of agronomy and farm management practices. For fertilizer management, the survey found that top-yielding canola growers:

- use more fertilizer, especially nitrogen.
- soil test more often.
- are more likely to use variable-rate fertilizer application.

Overall, 45 per cent of top yielders (top 25 per cent) applied 125 lb./ac., or more, of actual nitrogen, while only 14 per cent of low yielders (bottom 25 per cent) applied this amount. John Heard, crop nutrition specialist for Manitoba Agriculture and Resource Development, says that in many cases, this is a "shrewd" move. "Producers with less productive soils realize they can't simply buy yield with more nitrogen, so they dial rates back."

Variable-rate fertilizer application is still not that common. The survey found that 19 per cent of farmers who have yields over 52 bu./ac. use variable rate, compared to nine per cent of farmers with yields below 52 bu./ac.

On the topic of 4R fertilizer management, the survey found that 25 per cent of growers have a 4R fertilizer management plan while 30 per cent have never heard of 4R. More than half of growers have the same fertilizer plan for each field. On a regional basis, it seems 4R Nutrient Management is most common in the Brown Soil Zone. In that soil zone, 40 per cent of top yielders have a 4R nutrient management plan developed with a certified 4R agronomist, while only 14 per cent among the lowest-yielding group have such a plan.

Soil testing has room for improvement across the Prairies, but especially in central Saskatchewan. Of the growers surveyed from this region, 47 per cent said they soil test "less often (than every fourth year)" or "never". This is by far the lowest level of soil testing across the Prairies.

How often is each field tested for soil nutrient levels?

	Total farmers surveyed	PROVINCE		
		Alberta	Saskatchewan	Manitoba
Every year	29%	29%	24%	39%
Every second year	17%	14%	20%	13%
Every third or fourth year	25%	32%	21%	24%
Less often	22%	22%	24%	19%
Never	7%	3%	11%	5%

In the CCC survey of 1,000 farmers across the Prairies, 29 per cent said they soil test every field ever year and most soil test on a regular basis, if not every year. Saskatchewan has more farmers who said they soil test "less often" or "never".

Do you use variable rate to match fertilizer blends and rates to specific zones within fields?

	Total farmers surveyed	VR BASED ON CANOLA ACRES PER FARM			
		80-199 ac	200-399 ac	400-999 ac	1000+ ac
Yes, I'm doing it	11%	4%	6%	9%	17%
This is part of my five-year plan	9%	8%	6%	9%	12%
I'd like to, but don't have the mapping or application equipment required	32%	45%	45%	33%	20%
I'm not convinced	36%	40%	33%	40%	36%
I've tried it and had poor results	5%	0%	2%	3%	10%
Other	6%	3%	7%	6%	7%
Total (number of farmers in each group)	100%	100%	100%	100%	100%
	1001	73	203	341	384

Only 11 per cent of farmers are currently applying fertilizer at variable rates within fields. That percentage increases based on farm size. VR use increases to 17 per cent for farms with more than 1,000 acres of canola each year.

Credit: iStock.com/chengyuzheng

Soil nutrient analysis is an important step in 4R nutrient management. Fall tests done as close to ground freeze-up as possible will provide a good indicator of soil nutrient reserves in the spring. These reserves might be higher than you expect after a drier-than-normal growing season.

Use soil tests to take advantage of a challenging year

BY WARREN WARD

The principles of 4R nutrient management include a couple of jobs that could be done in the fall. One is soil testing – a relatively easy practice that doesn't require a large investment. The other is fall banding of nitrogen. Some Novembers provide weather suitable for both of these jobs. Soil tests for sure.

Soil analysis is useful every year, but may be especially useful this year with low and variable yields due to drought. Results should show higher nutrient reserves and lower required fertilizer rates for 2022.

SOIL TEST TIPS

Collect fall soil samples once the soil has cooled to at least 10°C. Cool soils reduce the microbial activity that can mobilize nutrients. By waiting until this activity slows down, the soil test result will be a more accurate indicator of nutrient levels next spring.

One composite sample per field can provide a general impression of soil nutrient levels. For the composite, take 15-20 sub-samples from the most productive areas – not hill tops, not low spots, not saline areas. Before blending these sub-samples to make the composite, divide each core into two or three soil depths and put them into separate pails. Three suggested depths would be zero-to-six inches, six-12 inches and 12-24 inches. Two depths would be zero-to-six and six-to-24. With the 15-20 sub-samples separated by depth, blend those samples to create one composite sample per depth. Submit each depth in its own sample bag.

For more precision, sample based on common zones within the field. Zones are generally based on productivity differences – often the result of soil characteristics, drainage or elevation. Three zones could be hilltop, mid-slope and low-lying areas. Follow sampling methods described above for each zone. This could mean up to nine samples per field (three depths for three zones), but this method can provide meaningful results for fields with higher levels of soil variability, and can point to the value of variable-rate application. This approach may also provide some insight into yield variability exacerbated by drought conditions in 2021.

Variable-rate application doesn't have to be complicated. For a low-tech option, growers could dial down nitrogen rates while passing over low-producing areas like saline areas and hilltops, or in areas that have higher levels of residual nitrogen following a challenging year.

4Rs FOR FALL FERTILIZER APPLICATION

The four Rs are "Right Source at the Right Rate, Right Time, Right Place".

RIGHT SOURCE. When making a fall application of nitrogen, the best sources are urea or anhydrous ammonia. Urease and nitrification inhibitors can reduce the risk of loss. Ask the fertilizer supplier about options. In fall, avoid nitrogen sources that contain nitrate, such as UAN, as this more mobile form of nitrogen can be lost over the winter.

RIGHT RATE. This is where the soil test comes in. For canola, we encourage a rate specific to the needs and yield potential of each field. If fertilizer blends specific to each field are not logistically possible, apply the blend at different rates to match the yield goal for each field.

RIGHT TIME. While spring is the ideal time from a 4R perspective, fall application can be a good plan B if logistics make it a challenge to apply enough nitrogen in spring. Make fall applications after soil temperatures have cooled to less than 10°C on well-drained sites and even cooler in high-moisture areas. Cool temperatures significantly reduce losses by reducing the rate of change from ammonium to the more loss-prone nitrate form.

Before fall applications this year, note that soil disturbance will reduce the snow-trapping capacity of stubble heading into winter. This moisture could be valuable after a drier-than-normal year. Also, if soils are too dry to provide a proper seal of the band, you may need to wait for better conditions.

RIGHT PLACE. Sub-surface bands reduce losses that can occur with surface applications. This is especially true for fall applications. Band at least two inches deep and space bands no more than 18" apart for cereals and oilseed crops.

Before banding, consider soil moisture. Banding in dry soils can also increase gassing-off losses because soil does not provide a proper seal on the band. For anhydrous ammonia application into dry soils, go deeper (four inches or so) into moisture to reduce losses. Banding in wet soil conditions can also increase losses if the soil does not close well over the band.

Surface spreading of nitrogen fertilizer in the fall can lead to major losses. Broadcast nitrogen should be incorporated, which will require greater soil disturbance, or include urease and nitrification inhibitors (as described under "Right Source") to reduce those losses. Once soils freeze or become permanently snow covered, nitrogen should no longer be broadcast, even when using an enhanced source.

—Warren Ward is an agronomy specialist and fertilizer lead with the Canola Council of Canada. Email wardw@canolacouncil.org.

Learn more at **canolacouncil.org/4R**

The Government of Canada hinted at a nitrogen policy in a broad-ranging report from last December. With the election out of the way, conversations on nitrogen use efficiency, as part of a large greenhouse gas reduction plan, will probably resume.

WE WILL HEAR A LOT MORE ABOUT NITROGEN USE EFFICIENCY

BY JAY WHETTER

Nitrogen use efficiency (NUE) is a hot – and getting hotter – topic for agriculture in Canada and around the world. Nitrous oxide is a potent greenhouse gas, and climate change policy will aim to keep nitrous oxide emissions to a minimum – from fertilizer production on down to field application.

Tom Bruulsema is chief scientist with Plant Nutrition Canada, and chairs an independent Scientific Panel on Responsible Plant Nutrition supported by the International Fertilizer Association. Bruulsema says the simple calculation of NUE is to take the amount of nitrogen in crop yield at harvest and divide that by the amount of nitrogen applied.

Based on farmer surveys, canola NUE on the Prairies was around 51 per cent for 2018-20, Bruulsema says. Improving NUE for canola or on a whole-farm basis, and then comparing that to other regions and other countries, will benefit from a standardized system of measurement, Bruulsema says. "Right now, there is no standardized method to report inputs and outputs."

While Canada and other countries work on a system to measure NUE, farmers can take steps to improve NUE and increase returns from their nitrogen investment.

"A great starting point is 4R," Bruulsema says. "These nutrient practices are highly related to NUE, and they put the emphasis on things you can manage."

These include steps that reduce nitrogen losses – such as banding in the soil or top-dressing just when the crop needs it.

The Canola Council of Canada (CCC) has a goal of 90 per cent of canola acres using 4R practices by 2025. "We see the value of maximizing fertilizer investments, while also being recognized for the environmental benefits that are achieved with 4R management practices," says Warren Ward, agronomy specialist and fertilizer lead with the CCC.

Nitrogen stabilizers also help to reduce loss. "Inhibitors are remarkable for their efficacy," he says, pointing to Canadian research on corn showing that nitrification inhibitors reduce nitrous oxide emissions by more than 30 percent and urease inhibitors reduced ammonia loss by 42 to 55 percent. He says global meta-analyses showed a drop in nitrous oxide emissions of 20 to 40 per cent when using a nitrogen stabilizer. (This is for higher risk situations and moist soils. "If you apply nitrogen close to when the crop needs it, you may not need a urease or denitrification inhibitor," Bruulsema says.)

Growers can improve NUE through crop management as well, Bruulsema adds. Cultivar choice, seeding timing, seeding rates – really anything that contributes to higher yield – will also contribute to NUE, he says. "If a farm fertilizes for a usual crop but only gets two-thirds of a crop, NUE drops by two-thirds as well."

With the fall election out of the way, the Government of Canada will probably resume action on the climate change file, which could include some guidelines on nitrogen use. As government policy evolves, the CCC will work with government agencies and researchers to answer key questions, including: What are the biggest factors for nitrogen loss? And what are the best ways to reduce losses and improve NUE?

We need more research. Michele Konschuh and Dilumi Liyanage, researchers from the University of Lethbridge, did a recent meta-analysis on NUE research. Using 730 comparisons extracted from 24 peer-reviewed publications, they concluded that simply adding more nitrogen did not improve NUE. They found only one situation from one study where NUE improved, and that situation included a combination of best practices that included right source, right place and right time.

Konschuh and Liyanage concluded that, "The lack of positive impacts for many management practices suggest that further research is required."

Farmers need this research if they'll be expected to make the right decisions to improve NUE.

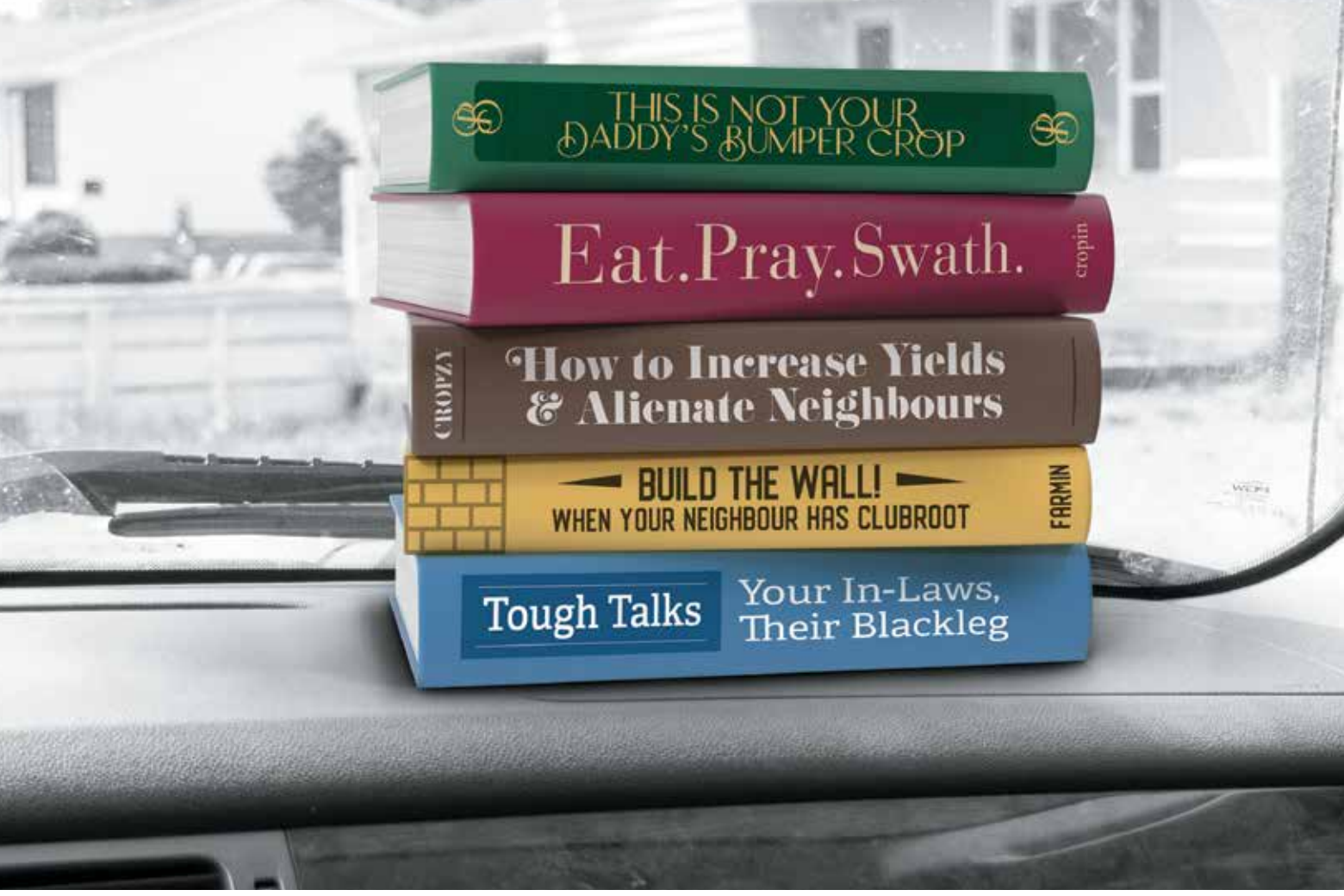
"We can expect increasing attention on nitrogen use," Bruulsema says. "Climate change as a political issue is getting stronger and stronger. Worldwide, countries are looking at incentives for action to reduce nitrous oxide emissions from fertilizer."

—Jay Whetter is the editor of Canola Digest.

"We can expect increasing attention on nitrogen use. Climate change as a political issue is getting stronger and stronger. Worldwide, countries are looking at incentives for action to reduce nitrous oxide emissions from fertilizer."

—Tom Bruulsema

To read more about the nitrogen use efficiency (and sulphur and water use efficiency) meta-analysis by Konschuh and Liyanage, search for "Main factors affecting nutrient and water use efficiencies in spring canola in North America" at **canolaresearch.ca**.



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Alberta Canola provided carbon policy updates through 2021 in a series of articles called "Temperature Check". With this article, the Temperature Check author shares highlights on existing programs and provides an update on the upcoming Federal Greenhouse Gas Offset System.

TEMPERATURE CHECK ON CARBON POLICIES

BY AYMIE HASLAM *(This article was written September 27, 2021.)*

Alberta Canola closely follows both provincial and federal carbon policies. Throughout the 2021 summer months, opportunities for engagement allowed our policy staff to amplify the voice of canola producers. We reported back to our producers through a series of articles called "Temperature Check", which you can find at albertacanola.com.

Detailed federal policy objectives were described in the document *A Healthy Environment and a Healthy Economy*, released in 2020. These objectives are based on commitments made in the Speech from the Throne and build upon the Pan-Canadian Framework on Clean Growth and Climate Change, released in 2016. (Search for both of these documents at canada.ca.)

The Pan-Canadian Framework describes climate impacts such as increasing cases of heat waves, floods, and droughts. According to the federal government, Canadian citizens pay for their environmental impacts when they must rebuild homes and businesses after a flood or a wildfire, or when paying higher insurance premiums and paying more for food and emergency services. The government's response was to create a carbon tax, pricing carbon and contributing to the carbon market to encourage investment in carbon emissions reductions.

In 2018, The Greenhouse Gas Pollution Pricing Act (the Act) received royal assent. This legislation outlines the federal government's carbon pricing system. Part one of the Act implements the carbon tax, which has been upheld by the Supreme Court of Canada. Part two established an output-based pricing system (OBPS), which created a monetary incentive specifically for industrial emitters to lower carbon emissions.

The Act provides a federal backstop for provincial carbon emissions regulation. The federal carbon tax started at $20 per tonne of carbon dioxide equivalent (CO_2e) in 2019. The tax will increase at a rate of $10 per tonne annually, to $50 per tonne in 2022. As of April this year, the carbon tax is at $40 per tonne. For reference, according to the United States Environmental Protection Agency, a "typical passenger vehicle emits about 4.6 tonnes of carbon dioxide per year." (Find this at epa.gov/greenvehicles.) It follows that the average amount spent on the carbon tax for a family with one vehicle would be $184 in 2021 and $230 in 2022. This cost is greater for farm families whose input costs are generally increasing.

Profit margins for family farms are shrinking. Farmers benefit from exemptions like those outlined in Bill C-206, which extends exemptions on farm fuels. Other industries also feel the pressure from the carbon tax. Transportation industries, such as shipping and trucking, must pay the carbon tax on their input fuels. The airline industry also feels the strain of the tax "since air travel accounts for between three and five percent of global CO_2 emissions – and those emissions are escalating," according to a CBC report.

Funds from the carbon tax are meant to encourage the use of green energy and investment in green technologies. A federal offset system would supply industries with a way to reduce emissions even further.

A FEDERAL CARBON OFFSET SYSTEM

The federal government is working on an offset system for trading carbon credits. These types of policies make room for carbon-reliant industries to achieve "net-zero" or even "net-negativity", meaning emissions are balanced out by carbon sequestration or when companies pay for carbon sequestration beyond what they emit. While writing this, the federal government had gone into "caretaker mode" around the September 2021 federal election. Development of the offset system is still underway.

Basis for the program comes from the Pan-Canadian GHG Offsets Framework, which the Canadian Council of Ministers on the Environment agreed upon in November 2018. Since then, the framework has undergone further deliberation. A comment period was established for the Carbon Pollution Pricing: Options for a Federal Greenhouse Gas Offset System paper in June 2019 and again this summer. These were opportunities for stakeholders to offer considerations for the federal system. Agricultural stakeholders agree that a strong Federal-Provincial-Territorial (FPT) agreement is essential to the development of effective and appropriate

An effective offset system would allow for the trading of carbon credits across provincial borders. ...Offset credit systems are essential to emissions reductions.

agricultural policy. This includes the development of a federal offset system. An effective offset system would allow for the trading of carbon credits across provincial borders.

Offset credit systems are essential to emissions reductions. They have the potential to "incentivize activities leading to reductions in GHG emissions or increases in GHG removals from the atmosphere by carbon sinks," as written in a policy impact statement posted March 6, 2021 in the Canada Gazette at canada.ca. Regulations are necessary for the creation of a federal GHG offset credit system and to authorize the Minister of the Environment to issue offset credits. The cancelation of the Conservation Cropping Protocol in Alberta was an unfortunate development in emissions reduction policy. This left a hole that must be filled to continue to support and recognize the environmental stewardship producers consistently carry out.

Volunteer offset systems are available for carbon credit trading, but because these systems are not regulated, they may not be consistent. Nevin Rosaasen, sustainability and government relations lead with Alberta Pulse Growers, says it is essential that producers thoroughly examine their contracts in these voluntary systems to ensure they are fully aware of the obligations and incentives.

Biological Carbon Canada (BCC) states that a regulated market trades government certificates, which indicate regulatory compliance. BCC explains that these certified credits, "based on an approved voluntary protocol", are traded between "non-regulated emitters and non-regulated suppliers" in a voluntary market. Standardization of regulations should be based on good science, whether regulated or voluntary.

Rosaasen also asserts that carbon sequestration is increasing annually, instead of plateauing as was previously thought. He talked about discoveries in soil carbon sequestration science that clarify the agricultural capabilities. Studies in soil organic carbon (SOC) provide important measurement contributions for the establishment of regulated offset systems. Brian McConkey, with Viresco Solutions, created a report on the Prairie Soil Carbon Balance Project, released in June 2019. McConkey's report states that "SOC was increasing at deeper depths than expected".

There is more to learn about carbon sequestration, and this knowledge – which will require more research – would make regulated offset systems increasingly effective.

Commissions like Alberta Canola are hopeful about the prospects of the Agricultural Climate Solutions program and eagerly await the next steps.

—Aymie Haslam is a policy analyst with Alberta Canola.

AFTER THE DROUGHT:
TOP 10 PREPARATIONS FOR 2022

Drought-like conditions across many parts of the Prairies in 2021 inspired the CCC agronomy team to put together this list to help with planning for 2022.

1. ASSESS THE SOIL NUTRIENT SITUATION

Short, thin, low-yielding crops use fewer nutrients, so soil nutrient reserves should be higher than usual after the 2021 growing season. This should reduce fertilizer application rates for 2022. A fall soil test will give a good assessment of available nutrients. November timing can work if probes can get in the ground. The 4R article on page 29 has more soil sampling tips.

2. PRESERVE THOSE RESIDUAL NUTRIENTS

Weeds growing after harvest can use residual nutrients that the crop didn't. Fall weed control can stop that take up before it starts to cause major loss of that residual resource. November is probably too late for fall weed control, because effective control requires good growing conditions and healthy, living plants. So the focus turns to weeds emerging in the spring before the crop. The good news is that nutrients will be returned to the soil as weeds decompose, but these nutrients may not be available – or fully available – for the 2022 crop.

3. KEEP STANDING STUBBLE TO IMPROVE MOISTURE SITUATION

Before doing that pre-winter tillage or harrowing, consider this: Stubble traps more snow, increasing potential soil moisture next spring. Phillip Harder, scientist with the Centre for Hydrology at the University of Saskatchewan, says stubble "drastically reduces" sublimation of the snowpack in the middle of winter. Sublimation is the conversion of water from the snow (solid) to vapour phase, bypassing the intermediate liquid stage. The first main mechanism for sublimation on the Canadian Prairies happens when solar radiation drives the phase change from solid to gas, then dry warm air absorbs the water vapour and wind blows it away. The second happens during blowing snow events where snow particles that get suspended in the windy and turbulent air mass are very efficiently sublimated into the airmass. Harder says sublimation is most intense in windy and open areas where chinooks are common. It is less extreme in areas with more bush and without chinooks.

4. ASSESS SUBSOIL MOISTURE HEADING INTO WINTER

What is the water situation in your fields? How much recharge occurred with late-season rain? A basic moisture probe is half-inch diameter metal rod with a 5/8-inch ball bearing on the business end and a crossbar handle on top. Push the ball end into the soil as far as you can without twisting it. It will only penetrate to the depth of moist soil, stopping when it hits a region of dry soil or a stone. Read "How to use a moisture probe" at canolawatch.org. For a more modern approach, some weather stations have soil probes that measure moisture down to one metre, and providing a yield estimate in the process. For more on these, read the January 2019 article "Probe of Possibilities" at **canoladigest.ca**.

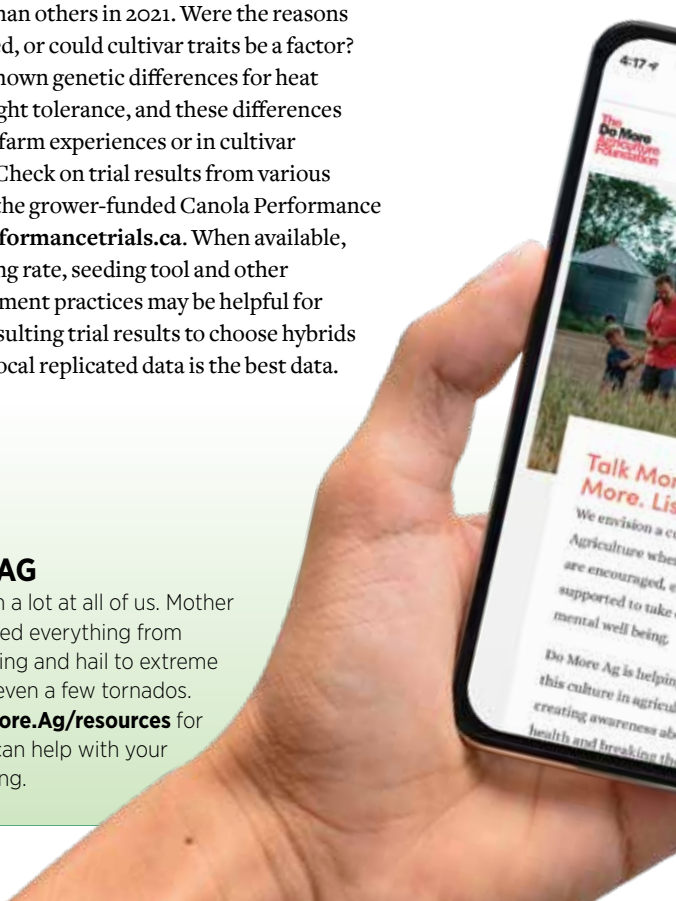
Stubble traps more snow, increasing potential soil moisture next spring.

5. CHOOSE CULTIVARS THAT PRODUCE WELL UNDER STRESS

Farmers may have noticed that some canola hybrids performed better than others in 2021. Were the reasons management related, or could cultivar traits be a factor? Researchers have shown genetic differences for heat tolerance and drought tolerance, and these differences may show up in on-farm experiences or in cultivar comparison trials. Check on trial results from various sources, including the grower-funded Canola Performance Trials at **canolaperformancetrials.ca**. When available, seeding date, seeding rate, seeding tool and other agronomic management practices may be helpful for context. When consulting trial results to choose hybrids to grow next year, local replicated data is the best data.

DO MORE AG

2021 has thrown a lot at all of us. Mother Nature has shared everything from drought, drowning and hail to extreme heat, frost and even a few tornados. Visit **www.DoMore.Ag/resources** for resources that can help with your mental well-being.



Compare cultivar results for various locations and years at ***canolaperformancetrials.ca****.*

6. IS WINTER CANOLA AN OPTION?

Not really. Past attempts at growing winter-types were not successful. Winter survival is low, and spring frost survival is even lower, in Western Canada. Will this change as winters get milder? Maybe. But good luck in predicting winter and spring temperatures. Even though there are a few winter cultivars registered in Canada, these are targeted for use in Ontario. Cultivars from the United States are not registered in Canada. Until winter and spring frost hardiness is improved dramatically, winter canola will not fit in Western Canada.

7. LEARN TO IDENTIFY VERTICILLIUM STRIPE

Verticillium stripe is one disease that can be severe in hot, dry conditions. Did you observe verticillium symptoms in 2021? High disease severity situations are rare but can result in yield losses. As research continues on this disease here in Canada, clearer management options will be identified to help minimize the spread of this disease and keep disease severity low. This is something to look for in 2022. Find more on verticillium, including scouting and management, in the Diseases section at **canolaencyclopedia.ca.**

8. PREPARE FOR MORE INSECTS IN 2022

Many insects thrive in dry conditions, especially flea beetles, lygus and grasshoppers. The experience in 2021 could set up us for high insect pressure in 2022. High flea beetle numbers in the fall are not a reliable indicator of issues next year, but pre-planning could include higher seeding rates to compensate for expected flea beetle feeding and upgraded seed treatments. Examine any factors that might impact crop establishment next year – especially residue management and seed bed preparation – for potential improvements. Seeding shallow (half to one inch depth) with a fine-tuned level seeder into a warm, moist seedbed will help with rapid emergence, which improves canola competition against flea beetles. Agronomy Insight in the September 2021 Canola Digest has more detailed tips to improve flea beetle management. Find the article at **canoladigest.ca**.

9. EXPECT SOME HERBICIDE CARRYOVER AFTER 2021

Residual herbicides need (1) soil moisture at the surface, (2) warm soil temperatures and (3) time for breakdown to occur as expected. Areas with very low moisture accumulation through June, July and August will be at highest risk for herbicide carryover into next year. Consider this when making cropping decisions. Please reach out to herbicide manufacturers for rotational details on all products applied in 2021 on fields planned for canola in 2022.

10. SIGN UP FOR CANOLA WATCH

Canola Watch provides timely agronomy updates from the Canola Council of Canada agronomy specialists, with input from extension specialists, researchers and provincial canola organization staff. The weekly email helps with scouting tips and management practices. Sign up at **canolawatch.org**. The Canola Watch website also has past articles, mini quizzes, the Canola Watch podcast, and a place for you to send us your questions.

Good crop establishment will benefit from some winter planning as described in this Top 10 list. Next spring, avoid spring practices that can dry out the seedbed. Get the drill ready to seed shallow and uniformly. Keep fertilizer out of the seed row, especially if plants are already stressed. Slow down if necessary to improve seed placement. These are good practices every year, and especially in a dry year. Hopefully we're working from a position of strength in 2022.

New research from Agriculture and Agri-Food Canada found that dairy cows' methane emissions, as a percentage of gross energy intake, declined as the amount of canola meal in the diet increased. This energy was captured in greater milk production, rather than lost to the atmosphere.

Cows fed canola meal make more milk, less gas

BY BRITTANY DYCK

Canola meal improves the environmental footprint of milk production. A new study shows that cows fed canola meal will produce more milk while also reducing their methane emissions and nitrogen losses.

Chaouki Benchaar, research scientist with Agriculture and Agri-Food Canada in Sherbrooke, Quebec, led the research featured in "Diet supplementation with canola meal improves milk production, reduces enteric methane emissions, and shifts nitrogen excretion from urine to feces in dairy cows," published in the September 2021 issue of Journal of Dairy Science. (journalofdairyscience.org)

"Canola meal improves the environmental footprint of milk production."

–Chaouki Benchaar

Benchaar and his research colleagues found that methane emissions, as a percentage of gross energy intake, declined as the amount of canola meal in the diet increased. This energy was captured in greater milk production, rather than lost to the atmosphere.

The researchers also found that more of the dietary nitrogen from canola meal was converted to milk protein, and less was lost in the urine with each incremental increase in dietary canola meal. (See the table.) Urine nitrogen contributes to atmospheric ammonia and nitrous oxide.

"It is really interesting that canola meal reduces methane emissions, shifts nitrogen excretion from urine to feces (i.e. less potential nitrogen emissions) and improves performance at the same time," says Benchaar. "Thus, canola meal improves the environmental footprint of milk production."

The diets were balanced to provide 16 per cent crude protein, with all the supplemental protein in the control diet provided by soybean meal. The test diets contained (on dry matter basis), zero, 8, 16 or 24 per cent canola meal. Dry matter intake and energy-corrected milk increased as canola meal in the diet increased, with no effect on feed efficiency (energy corrected milk/dry matter intake).

"To the best of my knowledge, the 24 per cent inclusion of canola meal is the highest ever tested in a controlled study," says Benchaar. "The all-canola meal diet resulted in 2.2 kg more energy-corrected milk than the all-soybean meal diet."

This research supports previous work on the life cycle analysis (LCA) model comparing cows in Quebec and Alberta that were fed canola meal versus soybean meal. For more information on canola meal as a feed source for cows, poultry, hogs and more, please visit **canolamazing.com**. The site provides the latest research findings, including this study, as well as accurate feeding values for canola meal. The site also has the Canola Meal Feeding Guide.

—Brittany Dyck is senior manager, canola utilization, with the Canola Council of Canada. Email dyckb@canolacouncil.org.

"To the best of my knowledge, the 24 per cent inclusion of canola meal is the highest ever tested in a controlled study,"

—Chaouki Banchaar

Visit **canolamazing.com** for the latest research findings as well as accurate feeding values for canola meal.

Table: Methane production and urine nitrogen losses

	Canola meal, % of total dry matter			
	0%	8%	16%	24%
Methane, g/kg of dry matter intake	18.92	17.82	17.16	16.72
Methane, % of gross energy intake	5.65	5.28	5.05	4.90
Methane, g/kg of energy corrected milk	11.44	11.00	10.56	10.12
Milk nitrogen, g/day	210.00	213.00	218.00	222.00
Urine nitrogen, g/day	238.00	234.00	224.00	224.00
Urine nitrogen, % of nitrogen intake	35.10	33.40	31.70	31.40

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Read the report and see what you have to gain : JohnDeere.ca/PAMI

*Internal John Deere test of X9 1100 Combine, based on field conditions.
**PAMI independent comparison between X9 1100 and Claas 8800 Combines.
†Internal John Deere test comparing X9 1100 and S790 Combines, based on field conditions, per unit harvested.