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FALL 2016
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FEATURES

DEPARTMENTS

ON THE COVER: The Fall 2016 issue of Alberta Seed Guide looks at several important subjects growers should know about, including new wheat class changes, Plant Breeders' Rights, pesticide regulatory changes and the global status of GMOs. There's a lot more within these pages, and we hope you enjoy this issue of *Alberta Seed Guide*.

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DAVID BISHOP

ALBERTA SEED PROCESSORS

KNOWLEDGE is Power: That old cliché still holds true regardless if we are conquering the unknown galaxies of outer space or trying to hit a maximum return target on a specific field.

As farmers, we are now operating in an ever evolving world of modern agriculture, with drones acting as virtual crop surveillance, GPS technology assisting in efficiency, to biotechnology boosting yields, while reducing the reliance on certain pesticides. The mere volume of data points that are gathered, nor the use of utilizing numerous gene splices does not necessarily make us better or smarter farmers. Frankly, at times the amount of data collected and technology available to us is mind-boggling. The bigger question is how do we use this information and technology to build on the basics of excellence in crop management that has been part of the evolution of modern agriculture?

Many of the critical crop management elements are not necessarily all that glamorous. For example, the subject of crop rotation to manage ever increasing disease pressure is very important in a sustainable agriculture model, but is not all that exciting. The things farmers do every day without really even taking into account are important links in the crop production chain. The balancing act, then, is to keep building a better chain by practicing good agronomy, but always seeking higher knowledge for the many questions this business of farming keeps throwing at us.

Many experts agree that yield is set very early in the crop establishment process; hence, unlocking the genetic potential of the seed in an optimum setting is key. We hear much about new diseases, insect and herbicide resistant weeds; but little about how important good quality seed is to our farming success. The Alberta Seed Processors is going to try to change that, by launching the SEED SMART project, which challenges every Alberta grower to know the quality of seed that he/she is planting. Regardless if seed is farm saved or pedigreed, knowing germination, 1000 kernel weight, and fusarium loading is an important, but yet undervalued investment. In addition, seed testing technology can further indicate additional key indicators, such as vigour, purity and pathogen presence.

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David Bishop
President
Alberta Seed Processors
Email: bisdvd@aol.com

ALBERTA SEED PROCESSORS

GLENN LOGAN

"CHANGE" is word that gets thrown around a lot these days, and for good reason. We live in a time when technological change is happening at a faster and faster rate. Thankfully, our industry is great at not only adapting to change, but also driving it. We create new technology to help us deal with modern-day challenges, and we're very good at using that technology to its full advantage.

Working in such a dynamic environment, it's incumbent on us all to stay informed regarding what's new not only in technology, but in all aspects of our work, including the regulatory system — which can often move slowly and arduously, even as change is happening all around it.

Knowledge is power, and that's what this issue of the Alberta Seed Guide is all about. From the latest in research to new products and legislation, we've tried to give you useful information to help guide you in your work within Alberta's seed industry.

As change happens at a more dramatic rate, staying informed about it all can seem like a daunting task. Thankfully, if you're reading this, you likely belong to an industry association like the Alberta Seed Growers (ASG). Such industry groups strive to ensure their members are up-to-date on what's happening throughout the industry, and what they need to know.

Our board determined over the summer that we have to focus more on internal communication with our members. ASG board members gain knowledge about a lot of new initiatives going on in agriculture, and as we gain that knowledge, we want to impart it to members so they can make the decisions that would help their own businesses.

But even board members can't know everything, and we know we have to do all we can to ensure we as a board work in our members' best interests. As a result, we're making a more concerted effort to get new people involved in ASG — both women and men. You'll read about three of these people in this issue's Seed Grower Profile.

In this issue's Viewpoints column, you'll read about the Alberta Agriculture Farm and Ranch Safety Coalition (AgCoalition), formed based on a common industry goal to foster a culture of farm safety in our province. ASG is proud to be a member — the people who make up the AgCoalition represent 96 per cent of the producers in the province, so it makes sense for us to join them.

We want to work with the industry, rather than just being a single voice in it, to ensure our own members are informed about important changes that can affect them.

There's an old saying that the only thing that will never change is change itself. It's true, and the best way to deal with that fact of life is to prepare oneself as best as possible for that change. Being informed is key.

Looking ahead to the next growing season, we hope you find time to do a little reading — so sit back and dig into this issue. We hope you come away with a little knowledge you didn't have before!

Glenn Logan
President
Alberta Seed Growers
Email: wheatcrestfarms@gmail.com

MINISTER CARLIER

AS Minister of Agriculture and Forestry, it is my pleasure to extend greetings on behalf of the Government of Alberta to the readers of the Alberta Seed Guide. The theme of this edition, *In the Know - Knowledge is your best tool for successful farming,* highlights the importance of Alberta producers staying current about the latest developments in agriculture.

As the largest renewable sector in Alberta, a strong and vibrant agriculture industry is essential to the continued growth of a diversified and thriving provincial economy. The ongoing success of our producers relies on their ingenuity and their ability to enhance the efficiency and sustainability of their operations, seize opportunities, and adapt to the evolving needs of the global marketplace.

Publications such as the *Alberta Seed Guide* are important tools for our farming community, providing valuable resources that help inform production decisions. The guide also helps showcase the depth and quality of our seed system, which is an essential part of the foundation of our agriculture sector.

Thank you to the Alberta Seed Growers and the Alberta Seed Processors for their continued work on behalf of Alberta producers, and best wishes for your continued success.

Oneil Carlier
Minister

Alberta Seed Guide

Fall 2016

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Wheat Class Modernization Process Moving Forward

The Canadian Grain Commission recently implemented the first phase of its wheat class modernization process. We examine what these changes will mean for the seed industry and how it will have to adapt.

AFTER more than a year of preparation and consultations with stakeholder groups across the country, the Canadian Grain Commission's (CGC) plan for modernizing Canada's wheat class system is now a reality.

The first phase of that plan took effect Aug. 1. Two new wheat classes were introduced – Canada Northern Hard Red (CNHR) and Canada Western Special Purpose (CWSP); and three wheat classes were eliminated – Canada Western Interim Wheat (CWIW), Canada Western General Purpose (CWGP) and Canada Western Feed (CWF). In addition, more than two dozen varieties were moved from the CWIW and CWGP classes to the two new classifications.

A second wave of designation changes will come into effect Aug. 1, 2018. That's when 25 varieties will be moved from Canada Western Red Spring (CWRS) to the new CNHR class and four others will be shifted from the Canada Prairie Spring Red (CPSR) class to CNHR.

It's the first time Canada's wheat industry has undergone this kind of top-to-bottom modernization since the early 1970s. It's being implemented in response to concerns expressed by some international customers, including Japan, that the gluten strength of certain Canadian varieties has declined and to tighten quality parameters for the CWRS class.

Daryl Beswitherick, the CGC's program manager for quality assurance standards, says the changes will provide more options to growers and end users while protecting the CWRS brand in international markets.

"We needed to make a move to be able to tighten the parameters for the Canada Western Red Spring class and the decision was made to create a new class (CNHR) to allow flexibility for producers to continue to grow the varieties that are going to transition into CNHR," he says.

Beswitherick says the commission is making every effort to inform members of the wheat industry what the changes

Photo courtesy Alberta Wheat Commission

On Aug. 1, 2018, Lillian will move from CWRS to the new CNHR class.

Photo courtesy Canadian Grain Commission

will mean for them and dispel some of the common misconceptions people have about the modernization process.

One of the most common misconceptions, he says, is that Canada Northern is the new premium class of wheat. In reality, CWRS is still the premium class for bread-making quality wheat. Another common misunderstanding, according to Beswitherick, is that some varieties will disappear as a result of this modernization process. In fact, no varieties will be deregistered, something only the CFIA Variety Registration Office has the authority to do, he adds.

Beswitherick adds it's too soon to say what impact the changes may have on the marketability of specific varieties. However, he says it appears preliminary prices for CNHR varieties are significantly less than for CWRS.

Informing the Market

Brian Kennedy, grower relations and extension coordinator with the Alberta Wheat Commission (AWC), says AWC representatives were busy last fall and winter meeting with growers across the province to ensure they were up to speed on the CGC's modernization plans.

"We're just trying to get information out there so there're no surprises on Aug. 1, 2018 when growers go to market their harvest," he says.

Kennedy says one of the things he and his colleagues have been telling growers is to start thinking now about what they want to grow, even though they might not transition to a new variety for another two years.

"We've been advising growers to talk to their local seed grower to see what grows well in the area. Because someone's had really good luck with [a variety like] Harvest they might not really know another variety that works well for them," he says.

"A seed grower in their area who has experience with growing a lot of different varieties [will] probably recommend a really good variety to move into. Seed growers generally are in the business for the long term. They're not going to give bad advice knowing they're going to lose a customer. They would rather give good advice and have that customer come back for 20 years."

Kennedy also recommends growers not be afraid to try a couple of different varieties to start with before determining what works best in their area and with their particular style of operation.

While he agrees it's too soon to tell how the changes will affect what farmers choose to grow, Kennedy says it stands to reason that sales of varieties moving into the Canada Northern class will drop since prices are expected to be lower than for CWRS varieties.

"Their goal is to grow something that fits into the CWRS market and get the higher price. They're not going to want to grow a Canada Northern Hard Red wheat and get a lower price for the same yield," he says.

Implications for Seed Companies

Brent Derkatch, director of operations and business development with Canterra Seeds, says modernizing the wheat class system could have some serious implications for Canadian seed companies.

"The biggest thing is…the industry doesn't collectively know yet what acreage shifts might occur with the different classes and varieties within those classes," he says.

Another concern for seed sellers, according to Derkatch, is how grain handlers are going to react to the changes. "There's now going to be another milling class that they need to deal with and segregation for both class and grade. Each grain company is going to have their own view about where the opportunities are going to lie," he notes. "Part of the unknown is whether the grain handlers are going to choose perhaps to focus on only…maybe two or three milling classes in certain areas because of the segregation challenges that are going to exist."

Derkatch says one of the biggest challenges for seed companies will be anticipating where demand is going to be and then communicating that information to seed producers so that inventory levels end up being where they need to be.

"It comes down to being a little more visionary," he says. "We'll certainly spend time with grain handlers here in the coming months and try to find out what we can about their intentions both now and in the future related to the different milling wheat classes, and then communicate [those] expected demands with our key seed producers across the Prairies."

Savouring the Opportunity

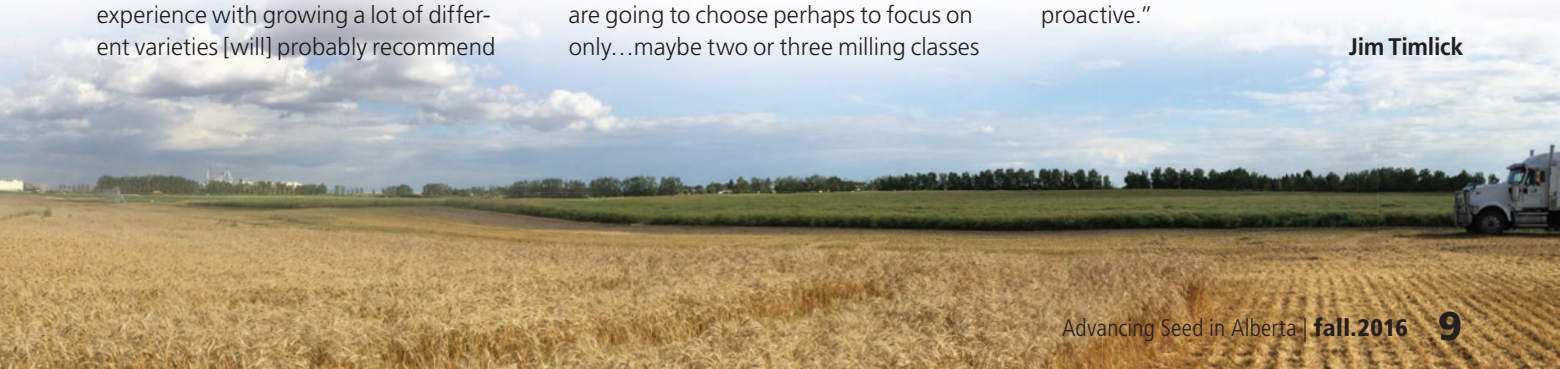
Greg Stamp, co-owner of Stamp Seeds in Enchant, Alta., says while he understands the uncertainty many in the seed business feel, he views the changes as an opportunity.

"There are going to be new varieties to grow no matter if a class changes and farmers will be switching varieties, so the farmer will say, 'I'm not sure what I'm going to grow so let's talk to the seed grower and see what makes sense,'" he says.

"The only thing that I could see catching us is if there's a variety that we don't know is going to be moved and we have that in inventory…how much of that are we going to sell? [But] that's really no different than me experimenting with some new variety that I hope sells well but doesn't."

Stamp's advice to seed growers is to make sure they communicate with their customers. "Communicating with our customers is going to be key – here's what's available, here's what's moving, here's what we think you should look at for your farm," he says. "That happens anyway but I think we [need to] be more proactive."

Jim Timlick



Understanding limiting factors is a huge part of driving yields in canola.
Photo: Janet Kanters

Pushing Canola Yields

IN RECENT years all across Canada, contests have been popping up challenging canola growers to put their management skills to the test.

In 2015, a grower at Birch Hills in Saskatchewan recorded 116.8 bu/ac on 1.26 acres to win a Pioneer Yield Challenge. Last year, hundreds of growers entered DEKALB's Seed for Yourself Yield Challenge, DuPont Pioneer's Yield Hero Challenge and the Canola Council of Canada's Ultimate Canola Challenge.

What is the goal of these challenges? And can they help address the needs of the world's ever-growing population?

How high can we go?

According to Murray Hartman, provincial oilseed specialist with Alberta Agriculture and Forestry, the Canola Council of Canada (CCC) goal for 2025 is 52 bushels canola per acre average for the Prairies. With that said, three of the western Canadian winners of last year's DEKALB's contest reached 70 bushels per acre or more. Hartman points out yield doesn't always equal profit, though. "Achieving very high yields for bragging rights is much different than achieving high yields that produce maximum profit," he says.

So what did the winners do to achieve such high yields? And are their management techniques economically viable? Joanne Kuhn, one of the winners of last year's DEKALB challenge, hit 70 bushels per acre in the Fort Saskatchewan region. She chose DEKALB's 74-54 RR, a high-yielding canola variety she knew would perform well in her area. She seeded at a rate of 4.25 lb/ac, and used a balanced nutrient program and sprayed for early weed control.

"Last spring was cold and there was a frost on the 18th of May, so the field in the yield challenge was reseeded on May 22," she recalls. "We had to reseed about half our acres of canola."

Luckily, a dry summer with timely rains kept input costs down. "With it being dry there wasn't disease pressure, so we didn't spray with a fungicide," says Kuhn. "There wasn't a need to use a pesticide on the field either."

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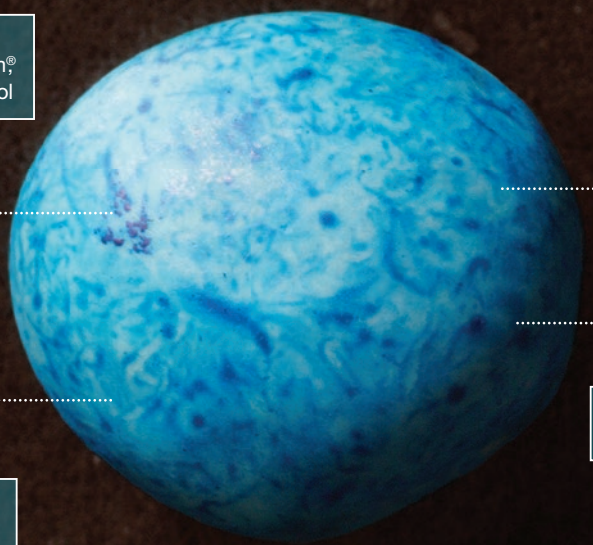

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"You can't achieve high yields if the weather doesn't cooperate."

—Murray Hartman

Pioneer Hybrid 45H33 Weighs in at 116.8 bu/ac

For all canola, corn and soybean growers in Western Canada interested in taking on the yield challenge, DuPont Pioneer offers the Yield Hero contest. Winners will be decided based on crop yield (in bushels per acre) and quality in all three crops.

The highest yields recorded as part of the 2015 contest were 116 bu/ac for canola in Saskatchewan, and 200 b/ac for corn in Manitoba.

The contest is open to Manitoba, Saskatchewan, Alberta and British Columbia growers. The 18 winners of this year's challenge will win a trip for two to the final weekend of the 2017 Tim Hortons Brier in St. John's, Nfld.

To participate, growers can contact their local Pioneer Hi-Bred sales representative.

"Our sales reps are involved right from the get-go in helping select the right product for the right acres and ensuring that they're placing it in the right soil conditions because each product, of course, does perform slightly different depending on the environment that it's put in," says Bryce Eger, business director for DuPont Pioneer Canada. "Selection of the product is very important because we can promote better yields."

This year, DuPont Pioneer has several new hybrids being offered in canola and corn. The two new canola hybrids are Pioneer Protector HarvestMax products 45M35 and 46M34. For corn, two new ultra-early maturity hybrids for Western Canada are P7005AM and P7202AM, along with two new high-yielding corn products P7958AM and P7632AM.

"We have invested and continue to invest in research and development in Western Canada, and that is an important part of providing high-yielding products: having research that is on the ground in the real conditions that are taking place," says Eger. "Our investment in Western Canada is very significant."

Although Kuhn found the winning combination to be economically viable, she did note weather was likely the biggest contributing factor to her success. "In 2015, we had the right conditions to get a great yield," she says.

Another of DEKALB's canola challenge winners produced an average yield of 78.4 bu/ac. Richard Wilde chose DEKALB's 74-44 BL variety and seeded at a rate of 5.8 lb/ac, planting about 1,000 acres of the same variety. "We always work the land before in the fall thinking that it helps make the soil warmer in the spring before we plant," says Wilde. "It also came off of irrigation so we were able to control the water portion fairly well.

"We sprayed two applications of Roundup for weed control, and one pass of fungicide," he adds. "I think this practice is economical to raise canola."

Like Kuhn, Wilde attributed his success to a good growing season. "The weather was rather dry and warm, and I actually think it was a contributing factor to be able grow that much canola," he says.

DEKALB product manager David Kelner says the Seed for Yourself Yield Challenge is really about what's possible in canola. Although they did have some protocol on the varieties from which participants could choose, ultimately growers managed their crops in whichever way they saw fit. Seeding rates and timing, and fertilizer and chemical inputs were all left up to the individual.

DEKALB marketing associate Marcus Moore found it particularly interesting the winning results came from different hybrids. That and the fact the numbers the winners were reporting were significantly higher than the provincial average.

"What we're doing here is not an endorsement of a whole-farm approach," says Kelner. "It's more of an exercise to show them, show us, show everybody what the potential is."

Last year's winners of the DuPont Pioneer yield contest from Alberta, Jim Herder based in Sylvan Lake, hit 84.3 bu/ac by planting Pioneer brand hybrid 45H33 RR; and Ron Krywko from Sturgeon County achieved 81.3 bu/ac with hybrid 45H33.

Debbie Stiles, DuPont Pioneer seed marketing manager for Western Canada, says growers are encouraged to showcase how Pioneer brand products perform using their specific farming practices, through their yield hero challenge. "It demonstrates that good agronomy, combined with elite germplasm, traits and technology, do make a difference in each farm's canola yield opportunity."

On Higher Yields: Contributing and Limiting Factors

Understanding limiting factors is a huge part of driving yields in canola. One of the biggest limiting factors in canola production is the weather. "You can't achieve high yields if the weather doesn't cooperate," says Hartman.

Beyond weather, growers can take steps to control disease and fertility. "We don't have any magical solution for fertilizer," Hartman adds. "Just make sure you're up on the three major ones: nitrogen, phosphorus and sulphur."

In 2013, the Ultimate Canola Challenge plots in Lacombe averaged slightly over 100 bu/ac, and there was no yield benefit for additional products such as boron or seed primers over standard agronomic practices and soil test recommendations of nitrogen and phosphorus. Thus, the cost of these additional products actually reduced profit, according to Hartman.

Disease control is another important factor that can affect yields. "When you do get good years, like this year, where we had a lot of rainfall from late May on, it's good for setting yield potential, but it's also good for disease," notes Hartman. "If you're getting those conditions favouring high yields, it's going to favour disease, so you really have to make sure your disease control is going to keep up with that."

Effective disease control includes a combination of good rotation, selecting a resistant variety and the use of fungicides for diseases like sclerotinia and blackleg. "For sclerotinia, this year we had continuing wet rain," says Hartman. "One application was probably a very wise choice over a lot of the area, but in some cases where there was a lot of pressure two applications were probably needed."

While choosing a good variety can help protect against yield loss due to disease, there's another factor growers may want to consider when choosing a variety: pod-shatter resistance. "Most of the time I just concentrate on making sure that the yield is there, but there is that aspect of certain newer varieties with pod-shatter resistance and better architecture, you know, not extremely lodged, more suitable for straight cutting," notes Hartman. "If you do everything right, you can gain five to six per cent yield by not having harvest losses."

According to Hartman, rotation plays a "funny" role in yield. Many growers who average high yields are encouraged to grow canola more frequently in shorter rotations. "The obstacle that comes up is that when you start shortening your rotation, you start achieving lower yields. If you're growing canola every second year versus every third or fourth year, it's a five to 10 per cent yield loss."

Hartman says this trend is all too common in the three Prairie Provinces. The most common canola rotation he sees is one and two, canola and wheat. "If you really want to achieve the highest yield, that's going to be the longer rotation," he says.

The biggest problem with tight rotations is disease control, notes Dan Orchard, agronomy specialist with the Canola Council of Canada. "Growers who are achieving super high yields tend to have a pretty good crop rotation, although that's not always the case," he says. "In general, the ones who aren't having a problem in central Alberta with clubroot are the ones who are on an extended rotation."

"If you do everything right, you can gain five to six per cent yield by not having harvest losses."

—Murray Hartman

This also holds true for blackleg. "It's not a problem in a four-year rotation," says Orchard.

Seeding rate can also impact yield. Over the years, Hartman has analyzed plant densities to see what density is needed to reach 90 per cent yield and it's about three plants per square foot. "But that's kind of the bottom end of where you should be targeting," he notes.

Ultimately, though, it is possible to push yields without using too much seed. "There are things you can do to kind of baby that seed to get higher emergence without spending more on seed," Hartman explains, mentioning really good moisture, fertilizer and slowing down during planting for better precision.

This winter Hartman expects there will be a lot of discussion on just what the plant density target recommendation should be. Expect further discussion at this year's Canola Discovery Forum in Winnipeg in October, as well as at FarmTech in Edmonton at the end of January. **Melanie Epp**

Varied Research Projects Move Barley Important Steps Forward

Alberta Barley funded barley-specific and multi-crop research projects answer key crop rotation, pesticide application timing and food barley milling questions.

ALBERTA Barley knows that building a viable, sustainable, financially and agronomically attractive crop demands on-going investment. For this reason, the crop commission's top priority is research.

Over the past few years, Alberta Barley has committed significant funds to both barley-specific and multi-crop research projects. The combined findings, says Alberta Barley's research manager Garson Law, are helping barley make important strides forward as a preferred crop in Albertan fields.

"Barley has a lot of potential. As a commission, we want to support research that helps barley achieve that potential," says Law. "Most of our funding is directed towards barley specific projects but we also periodically engage in projects that affect the whole farm and, therefore, affect barley peripherally."

Three noteworthy projects funded in part or in whole by Alberta Barley recently concluded. The first – a project conducted Farming Smarter to analyze the best time of day for herbicide application – is described on page 40 of this Guide.

The second is a food barley co-milling project that, while seemingly simple, might someday have major implications on barley consumption in North America.

Barley is a staple food in Japan, Morocco and certain other parts of the world. It offers proven health benefits because it contains beta-glucan, a soluble fibre that aids digestion, prevents certain types of cancer and modulates blood glucose. Here at home, however, the vast majority of barley grown is used for malting or livestock feed. In fact, just one per cent of barley grown and sold into our domestic market is used in food applications.

Ashok Sarkar (l) and Elaine Sopiwnyk (r) in Cigi's pilot flour mill.

Photos courtesy Cigi.

"In Canada, barley is typically eaten as pearled barley in soups or casseroles. But consumption is low," says Canadian International Grains Institute (Cigi)'s director of grain quality, Elaine Sopiwnyk. "The priority is to figure out a way that it can be milled into flour so you can put it into many food products. Currently, there's very little uptake on that end because there is a perception that it isn't easy to mill barley into flour."

Barley can be handled very similarly to wheat except for one significant stumbling block: it has a very soft endosperm which causes the flour particles to be sticky and makes it difficult for them to move through milling screens. In order to solve these issues during milling, Cigi researchers decided to try co-milling barley with wheat.

Sopiwnyk and lead researcher Ashok Sarkar, Cigi's senior technology advisor, combined varying ratios of wheat with hull-less barley (80:20, 70:30, 60:40) to test milling extraction, milling performance and flour quality. The results were very encouraging.

"When using barley with waxy starch characteristics, which is challenging to mill, poorer extraction and processing qualities can result. We found that using a blend of 40 per cent barley with 60 per cent wheat was good. We could have gone to a 50:50 blend and that still would have been doable," says Sarkar.

The major finding, however, was that milling barley with wheat was possible with no changes to a regular wheat mill's processing equipment or system.

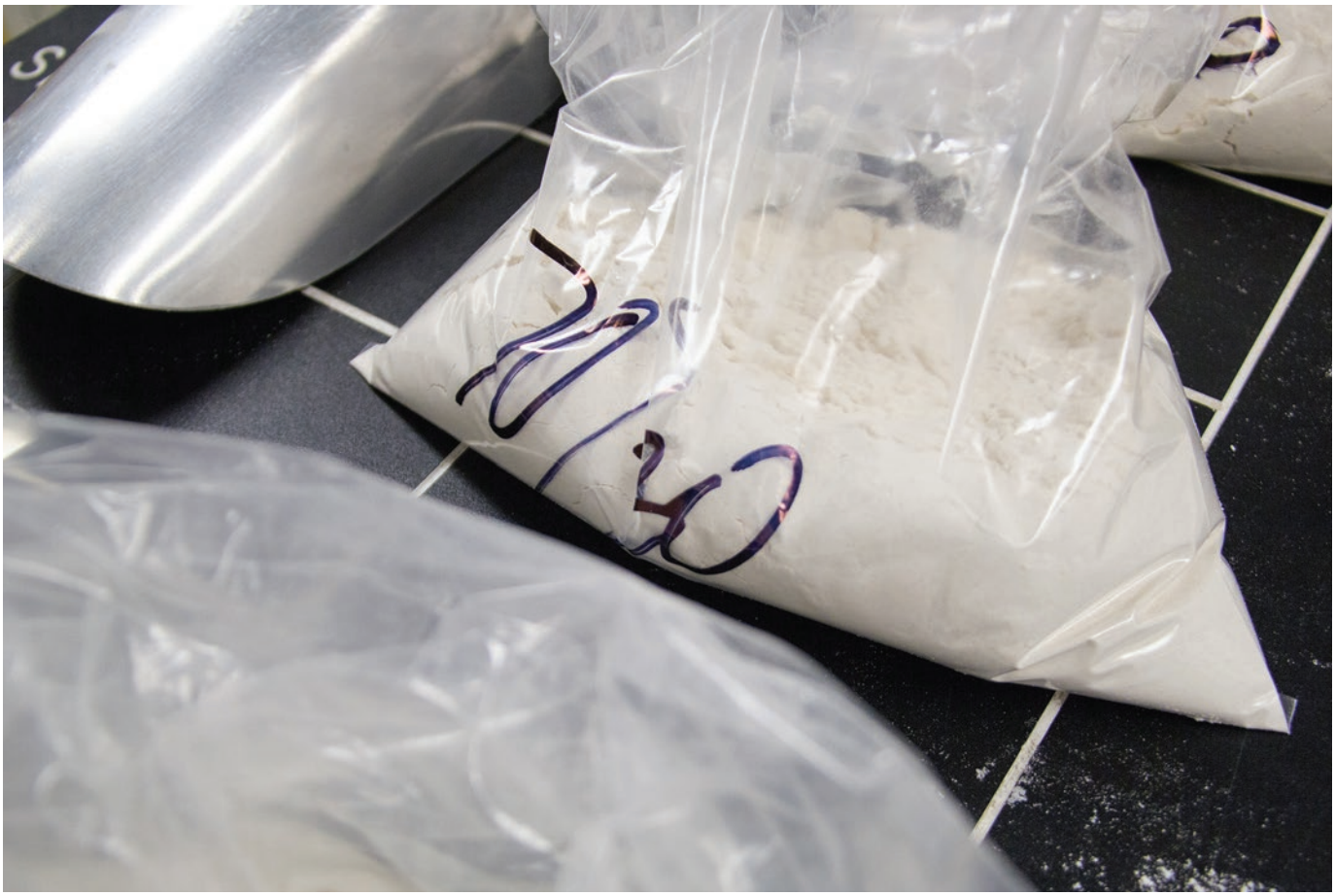
"We found that you can mill barley successfully with wheat just by blending them prior to milling, without any changes to production or cleaning processes," says Sarkar. "This research will help millers feel confident about the processing properties of barley. They won't be compromising the through-put of their plant, and they won't necessarily have to settle for lower flour extraction as you would if you were milling barley on its own."

While formal tests to analyze the baking characteristics of the barley-wheat flour were not part of the project's scope, the researchers did complete some informal baking trials.

"Because of its high level of soluble fibre, barley tends to absorb more water than wheat flour. So, you have to put more water into your dough. And because it takes a little while to absorb that water, you have to adapt your mixing process somewhat. You might also have to adapt your dough handling. But overall, these are all relatively minor challenges compared to the health benefits you gain from using barley," says Sopiwnyk.

The biggest challenge to increasing the use of barley in domestic food applications is one of production versus demand. Barley varieties that offer the high beta-glucan food benefit come with certain agronomic challenges, specifically fairly low yield. Unless a miller or other buyer were willing to pay a premium for the barley, it is unlikely a farmer would choose to plant the varieties that suit food applications. On the other side of the equation, millers might be interested in including barley in their flour blends, but unless they can get a consistent supply of the grain they are unable to commit.

"It's the age-old chicken and egg problem. As great as what we did was, there is almost negligible production of



Barley flour blends: Flour produced from the co-milling of wheat and barley (70:30) in Cigi's pilot mill.

food barley right now," says Sopiwnyk. "Our hope is that barley in food applications will become more conventional. But we're years away from that still, I think."

The third recently concluded project funded in part by Alberta Barley was a seven-year study undertaken by the Smoky Applied Research and Demonstration Association (SARDA) to optimize crop production through superior crop rotations.

"Our goal was to identify which crop rotations would provide farmers with the greatest yields and returns with the least amount of risk," says Kabal Gill, SARDA's research coordinator.

For the study, Gill compared 10 different crop rotations with various combinations of wheat, canola, barley, peas and flax, plus two monoculture (exclusively wheat and exclusively canola) baselines.

Averaged across the multiple years of the study, canola planted as part of crop rotations boasted an average yield increase of 11.6 bu/ac (19.9 per cent) over canola monoculture. Likewise, wheat grown in rotation with other crops showed an increase of 6.6 bu/ac (10.3 per cent) over wheat monoculture.

Not surprisingly, the research showed major fertilizer savings of nitrogen when the rotation included peas and sulphur when canola was not part of the rotation. Barley used more water than other crops; peas and flax used the least.

In order to rate the varying crop rotations, Gill calculated their contribution margins (CM), which is a crop's gross return minus associated input costs. He then factored in risk: because growing different crops spreads risk, he ranked more diverse crop rotations higher than less diverse systems with equal CM.

Based on this formula, Gill determined the best rotations were canola-pea-wheat (which ranked number one in CM), wheat-barley-canola (ranked number two in CM), barley-wheat-canola (ranked number five in CM) and peas-canola-wheat (ranked number six in CM). Rankings three (canola monoculture) and four (canola-canola-wheat) included multiple years of a single crop, so did not offer the risk management benefits of a more diverse rotation.

That said, the rating is dependent on the prices of inputs and crops, and as such, will change as prices change.

"As an agronomist, I'm more interested in production than economics. I have confidence in the yield benefits we proved through this study. But farmers need to stay informed about prices so they know that if they are getting an extra 10 bushels an acre because of a particular rotation, they can pencil in the returns based on current prices," he says.

Alberta Barley is always interested in funding or helping to fund research projects that will support barley's growth into the future.

"Because barley is a relatively small crop in acreage, there is a limited amount of research we'd be able to do if we tried to fund all of the projects ourselves," says Law. "So, we try to collaborate with partners to leverage our research dollars.

"These projects are particularly interesting because each one offers a positive immediate or peripheral impact to barley producers. Our priority is to translate our research dollars into more barley being grown." **Madeleine Baerg**

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Bees are still doing well in Alberta.

Photo: Janet Kanters

How to get a GOOD BUZZ

Bees are the oft misunderstood and unsung heros of agricultural production.

DESPITE some doom and gloom reports of the demise of bee populations and a murderous rampage by pesticide applicators going after mosquitos in the southern U.S., the good news is bees are still doing well in Alberta.

However, as an agricultural commodity that depends on other commodities and vice versa, beekeepers and crop producers need to work together. With careful management of honeybees, as well as additional food and habitat for wild pollinators, canola growers and producers of other flowering crops, such as buckwheat, can count on a well-pollinated crop.

It all comes down to communication to ensure healthy crops and hives, according to a beekeeper in Stony Plain, Alta. Lee Townsend suggests it's easy to blame farmers when issues arise over bee health, such as is happening with the neonicotinoid debate, but he says keepers need to take some responsibility for looking after their operation.

"In the mid-2000s, we had issues and we couldn't figure it out," Townsend explains. "We formed an alliance to develop a hive health initiative and, in three years, we understood our issues and were well equipped to deal with them. We had trouble with varroa mite controls no longer working and we had to figure out how to get ahead of them. We also looked at hive location and using good bee stock. It was a lot of work but we got it turned around. We never considered neonicotinoids or any other agrochemical to be a problem for the bees. Pesticides only become a problem if bees are weakened for other reasons."

In the end, Townsend suggests good management of bee colonies is the most important aspect of production, which requires working alongside neighbours. He says if there could be a benefit of all the negative publicity over the last few years, it would be the increased knowledge about the bee industry.

One way growers can help bee producers and reap the benefits of having bees in the neighbourhood is to provide additional food that will keep both wild and managed bees in the area. Researcher Jessamyn Manson, an adjunct professor of biological sciences at University of Alberta, says keeping wildflowers or seeded forage crops along the verges of a field will keep bees in closer proximity to flowering crops.

"Scientific data suggests that more bees and more types of bees are good for seed yield," Manson reports. "Bees are a resource that are already in the environment and, if we can manage them for better use, crop producers will benefit."

Manson adds wild pollinators can actually do a better job pollinating some crops than honey bees, but if provided, there can be enough food for all pollinators. She says wild flowering plants and nesting habitat at the edge of the field will encourage wild pollinators to overwinter, which will put them in a good position to start work in the spring. She has some concerns about pesticides and would like to see a system of integrated pollination and pest management.

Another beekeeper and the former chair of the Alberta Beekeepers Bee Health committee agrees with Manson's suggestion of providing bee habitat on the verges. Adam Ovinge would like to see the wasteland corners of pivot irrigation seeded to bee forage as well.

"We'd like to see a cover crop in those areas," Ovinge explains. "This would benefit the environment and protect pollinators. It would reduce discing or plowing to keep weeds controlled and

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Do Pesticides "Train" Bees?

Research at the University of Guelph suggests bumblebee behaviour is changing due to pesticide presence. A reported decline in global pollinators suggests an impact on food security. The study suggests normal level exposure to neonicotinoid insecticide has an impact on the foraging ability of bumblebees in crops that have complex flower shapes, such as white clover. Wild pollinators appear to be the focus of the research that suggests exposure to pesticides impedes the bees' ability to learn how and where to collect food. In a media release explaining the study, the researchers reported: "...While bumblebees exposed to pesticides collected more pollen than control bees, control bees were able to learn how to manipulate these complex flowers after fewer visits."

The research was a collaborative effort between the University of Guelph and the United Kingdom Insect Pollinators Initiative. Dr. Nigel Raine, the Rebanks Family Chair in Pollinator Conservation at the University of Guelph, says there is an increasing need for field research into the impact of all pesticides on bumblebees and other wild pollinators.

"Our results suggest that current levels of pesticide exposure could be significantly affecting how bees are interacting with wild plants, and impairing the crucial pollination services they provide that support healthy ecosystem function," Dr. Raine reports.

I don't think the cost would be prohibitive to put in a cover crop. As much as seven acres are available in the pivot corners which could be used for something else, such as perennial vetches or forages that could also be a crop."

Townsend suggests pesticides can be managed to protect bees. He says systemic pesticides used in seed treatments have been a saving grace for bees because they don't affect the bees as long as the insects are healthy. Foliar sprays can be much harder on honeybees, he says, especially if they are sprayed when the bees are at work. He believes the only time a seed treatment could cause an issue is if the seed is mishandled or seeded incorrectly.

"In a perfect world we wouldn't need pesticides," Townsend says. "But it's not a perfect world, so we need to work together."

"Neonicotinoids are the safest class of pesticides we have," comments Ovinge. "The outcry is by people who don't understand the issue. If foliar spray is necessary during the peak foraging time, alert the beekeeper so the hives can be moved. Beekeepers also need to be better communicators and let growers know there are bees in their area. We used to hide the hives because people react with fear, but maybe we need to do a better job of educating the public and our farm partners."

Manson says in Western Canada there is plenty of food to go around for both honeybees and wild pollinators; there just needs to be better habitat management. She says there is data from around the globe that shows an increase in the yield of many flowering crops when wild pollinators are present.

"Communication is paramount for healthy bees and healthy crops," says Ovinge. "We are getting better at talking to our neighbours. I've even started getting calls from aerial sprayers about when they are going to spray."

He adds as crop producers get more efficient there are fewer fence lines or marginal areas for bees and he would like to see attention given to preserve bee habitat, such as seeding the pivot corners to forage.

"Despite what you see in the media, our industry is thriving," says Townsend. "The best things farmers could do for us is to give beekeepers access to high land, north shelter, natural water sources, provide good crops for foraging, access to fields and communication. There's a huge benefit to having bees in the area."

Research continues on bees and their relationship to agriculture. No one disputes bees are good for crops. What is needed is communication between sectors so beekeepers can provide the insects that crop producers need to ensure healthy, pollinated crops. **Rosalie I. Tennison**

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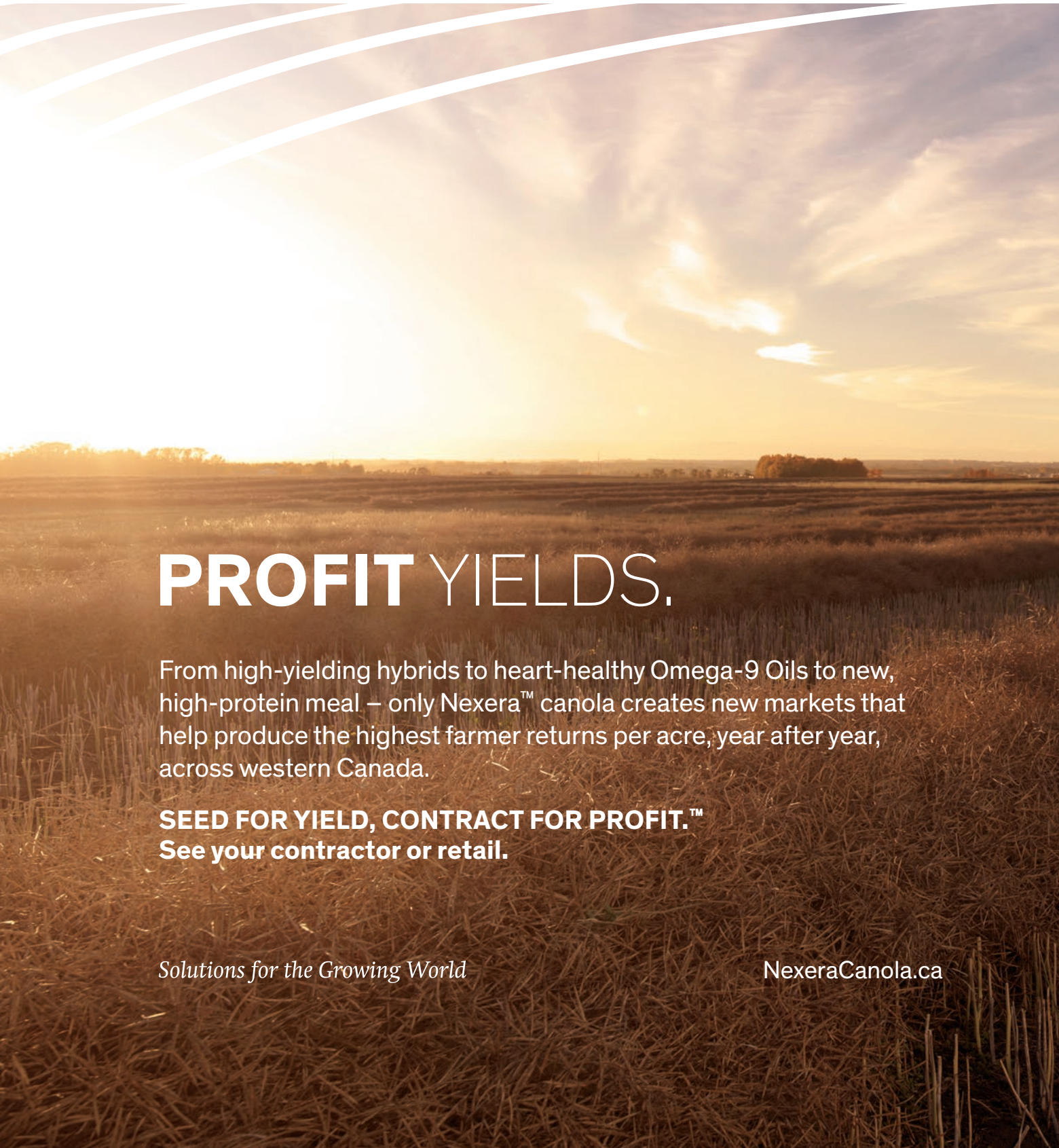

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COURT CASE HIGHLIGHTS IMPORTANCE OF PBR

Plant breeders' rights have come into focus this past year as a result of new federal legislation. We examine what this legislation and plant breeders' rights mean for the seed industry.

PLANT Breeders' Rights (PBR) does not often make headlines in this country. But when a Moose Jaw area farmer agreed earlier this year to pay a $150,000 penalty for unauthorized sales of two protected seed varieties, people within and outside the industry took notice.

This past February, Harvey Marcil of Pasqua Farms agreed to pay a $150,000 settlement to SeCan for the unauthorized sale of CDC Bethune flax and AC Strongfield durum. Marcil also agreed to refrain from selling the two varieties without proper authorization. Distribution rights for the two PBR-protected varieties are held by SeCan, one of the country's leading seed distribution companies.

Todd Hyra, SeCan's business manager for Western Canada, says the case was significant for a number of reasons, first and foremost because of the large dollar figure attached to it. The largest previous settlement involving the illegal sales of SeCan genetics was a $130,000 agreement that was reached in 2013.

"This [recent] one was important because it was large enough to make people notice and allowed people to understand the gravity of the situation and that [these actions] can result in significant damages," he says.

Hyra stresses the recent case was also important because it helped to educate people about the importance of plant breeders' rights to the seed industry and what the consequences can be when growers don't follow the rules.

"It's important not just to have the people who are not following the rules [know] but also the people who are following the rules and let them know they're doing the right thing and we're taking to task the people who are infringing on plant breeders' rights," he says.

"If there's no examples of ramifications for infringement then people just think they can get away with it and it gets to be habit."

New Legislation

Plant breeders' rights have received increased attention within the seed industry this past year with the recent adoption of PBR '91. The new federal legislation was adopted Feb. 27, 2015 and is designed to protect the abilities of breeders to produce, reproduce, clean and sell PBR-protected seed varieties.

All new varieties submitted for PBR will be protected by the new legislation while all varieties granted protection prior to last year continue to be protected under the original PBR Act.

Lorne Hadley, executive director of the Canadian Plant Technology Agency, says one of the primary reasons the new legislation was adopted was to bring Canada in line with international plant breeder rights.

Because Canada didn't have the same PBR standards as some of its counterparts, many foreign companies and breeding programs were unwilling to share their knowledge and products with Canadian interests, he says.

While some within the seed industry have suggested the new legislation is an attempt to sell more certified seed, Hadley says that isn't the case. He says PBR '91 is in place to ensure buyers' purchase seed from a legitimate seller.

"There's no reason to be apologetic about being the one who developed a new variety," he says. "If [producers] want improved varieties, one way or another they're going to have to pay. It's that simple. As diseases change and as market requirements change and higher yields are needed…it takes time and money to develop those new varieties."

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Hadley states more will be done to educate the industry that protecting plant breeders' rights is about driving innovation in the seed industry.

"We did an estimate in the middle of the last decade in both private and public institutions that a brand new variety has a million dollars worth of development costs before the first seed is sold," he says. "Plant breeding is a high-tech, high intensity system. Good plant breeding has both art and science involved. It's a very complex business and the best breeders are teams of people. There is someone who knows the genetics of a crop, there're people who know the crop and are able to test it. It's not a simple process."

"Good plant breeding has both art and science involved."

—Lorne Hadley

Hadley points to the canola industry as an example of what a successful plant breeding program can mean. He says many of the canola varieties that are available today were the result of companies investing in research to compete for the seed purchasing dollar.

Protection for Seed Growers, Farmers

Kelly Barany, co-owner of Chin Ridge Seeds in Taber, Alta., says plant breeders' rights are essential for the survival of companies like her family-owned operation. She says PBR protects her company's ability to sell products at a price that covers the time and costs related to producing certified seed.

"It takes four years for us to produce certified seed from breeder seed and our extra costs include labour and machine time to plant small plots and rogue the plots and clean the seed. We [also] have crop inspection costs, lab test costs and a lot of paperwork that is required to meet seed requirements," she says.

Barany adds failure to protect the rights of plant breeders harms not only them but also farmers. "Less royalties mean breeders have reduced capabilities to breed seed. Ultimately, it means that farmers will lose out on the variety advances that these breeders would have developed with the right financial support," she says.

Barany agrees more needs to be done to educate both growers and the general public about why protecting breeding rights is important. "I think we need to promote the successes that Canadian breeders have had and how that has ultimately helped Canadian farmers through increased yields and better quality [products]. In addition, we need to continue to educate farmers on what the blue certified seed tag stands for, including the quality standards that are behind [that] seed," she says.

"I think the more that people appreciate the value of certified seed, the more support there will be of the system that makes it viable." **Jim Timlick**

Photo courtesy SeCan

A recent PBR court case has helped educate people about the importance of plant breeders' rights to the seed industry and what the consequences can be when growers don't follow the rules.

TUAs vs. Royalties

Technical use agreements (TUA) and royalties are terms often used in association with plant breeders' rights. Both play a vital role in the work of breeders and researchers to develop new and improved varieties of seed.

A TUA is essentially a contract between a producer and a technology supplier (i.e. a seed buyer and a seed supplier). It sets out specific terms of use for a particular product.

Royalties, on the other hand, are a payment made as part of the sale of a variety. In most cases, a portion of that sale flows directly back to the breeder. It's similar to the sale of a music CD with a portion of the sale going back to the artist who produced the work. Royalties can be paid on both protected and non-protected varieties.


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Global Status of GMOs

Smoother access to export markets pinned to hopes for more predictable regulatory approval processes.

Acreage of DroughtGard maize, first planted in the United States in 2013, increased 15-fold from 50,000 hectares in 2013 to 810,000 hectares.

YOU'VE come a long way, baby. That's an expression that easily sums up the progress of GM crops over the last 20 years.

In its report *Water Efficient Maize for Africa*, ISAAA states that global cultivation of biotech hectarage increased 100-fold, from 1.7 million hectares in 1996 to a whopping 179.7 million hectares in 2015.

ISAAA – the non-profit group International Service for the Acquisition of Agri-Biotech Applications – estimates that since 1996, farmers in up to 28 countries have reaped more than US$150 billion in benefits from biotech crops.

And if new developments in 2015 are any indication, the future is bright for GM crops. New approvals and/or commercializations occurred in several countries last year, including the U.S., Brazil, Argentina, Canada and Myanmar. There were a number of "firsts" in the U.S., including the introduction of Innate potatoes (bruise-resistant and with lower levels of acrylamide, a potential carcinogen) and Arctic apples (do not brown when sliced).

"Acreage of DroughtGard maize, first planted in the United States in 2013, increased 15-fold from 50,000 hectares in 2013 to 810,000 hectares," notes the ISAAA. "More than 85 potential new products in the pipeline are now being field-tested, including a biotech drought-tolerant maize from the *Water Efficient Maize for Africa* project expected to be released in Africa in 2017, Golden Rice in Asia, and fortified bananas and pest-resistant cowpea in Africa.

However, Jim Everson, executive director at Soy Canada, would like to see market access challenges reduced for biotech crops in places such as Europe. "There were two recent proposals relating to EU member states being able to opt out of GM crop production and also importation of GM crops, but the second was recently defeated," he explains. "We were relieved about that, and would be very concerned if that proposal were presented again. Europe is a big market for soybeans used as protein source in animal feeds."

Soy Canada would also like to see faster EU approval of new GM soybean varieties. Part of what takes so long is the fact GMOs in the EU are regulated in a two-stage process by two entities: the European Commission and European Food Safety Authority. In addition, some EU members have their own regulatory agencies that may involve themselves with biotech crops.

"We'd like to see more science and more predictability in the approval process," Everson notes. "More choice in what to grow benefits Canadian farmers."

However, progress on the EU front with these issues is affected by politics, according to Dr. Wendan Wang. He wrote in the June 2016 issue of *Food Safety Magazine*: "…the rise of environmental and often 'anti-GMO' groups have been taking

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a larger role in policymaking at regional, state or even European levels." Wang notes, however, that GM crop approval timelines and the number of GM approvals in the EU ranks third worldwide, with only the U.S. and Japan ahead.

China, the U.S. and the Future

The Economist reported earlier this year that 20 years ago, China was doing a huge amount of GM crop testing, but since then, it has grown much more conservative due to consumer concerns over both food safety and reliance on foreign GM crop technology. The GM crop approval process in China, Everson notes, is currently similar to the EU's, in that it's lengthier and less predictable than it could be.

However, there have been two indications this year of growing Chinese interest in GM crops. In the country's annual statement on agriculture released in January, the Chinese government stated it will "carefully promote" them, and in April, an agriculture ministry official announced China will move forward with commercial cultivation of GM maize over the next few years.

Bruce Jowett sees these developments as signs the Chinese government is realizing its population both needs and wants higher-quality food, which must either be grown within the country or imported.

"At the Canola Council of Canada, we continue to help Chinese consumers understand the benefits of Canadian canola and our production systems," explains Jowett, the Council's vice president of market development. "We talk with media and do presentations. We are cautiously optimistic about the Chinese increasing their understanding of GM technology. It's positive that consumers there, like consumers elsewhere, increasing want to know more about their food and how it's produced."

To Jowett, building trust in biotech crops in China and other similar markets starts with educating consumers about the benefits. "Consumers need better information about the benefits of biotech crops in terms of sustainability and the crops' ability to feed China's population," he says. "There is room for increased understanding about how these technologies provide a consistent and high-quality food supply."

Bruce Jowett

Jim Everson

In the U.S., after years of wrangling and heated debate, the Senate and Congress both approved legislation in July requiring food manufacturers, in years to come, to begin using one of three labels to inform consumers of the presence of GMOs. The details are being worked out.

Jowett isn't sure whether this development will affect the import of Canadian GM crops. "There are many unanswered questions," he says. "For example, canola oil doesn't contain genetic material, so will they define it as GM or not GM? And most importantly, if labelling does negatively affect consumption or importation of biotech crops and food products, where will the U.S. source replacement food?"

Everson agrees many unanswered questions remain, including what form the labels will take and where they will be required to be placed on food products.

In conclusion, Jowett notes although naysayers of GM food have gained ground in the global arena of public opinion in recent years, he believes the results of recent new studies, as well as meta-analysis of hundreds of studies, continue to show GM crops to be safe for humans and the environment.

"We still have naysayers," he says, "but the science has really pushed forward and re-established its strong voice."

Treena Hein

Just the Facts

- Over 1996 to 2015, a cumulative hectarage of two billion hectares of biotech crops was cultivated globally (equivalent to twice the total land mass of the U.S.) in up to 28 countries.
- The annual global hectarage of biotech crops so far peaked at 181.5 million in 2014.
- For the fourth consecutive year, developing countries planted more biotech crops.
- Of the 28 countries planting biotech crops in 2015, 20 were developing countries.
- Among developing countries in 2015, Latin America had the largest hectarage of biotech crops, led by Brazil and followed by Argentina.
- In 2015, Latin American, Asian and African farmers collectively grew 54 per cent of the global 179.7 million biotech hectares.
- Stacked traits occupied about 33 per cent of the global 179.7 million hectares in 2015.
- Vietnam planted a stacked biotech Bt/HT maize as its first biotech crop in 2015.
- Acreage of the first biotech drought-tolerant maize planted in the U.S. (DroughtGard, first planted in 2013) increased 15-fold from 50,000 hectares in 2013 to 810,000 hectares in 2015.
- A global meta-analysis of 147 studies for the last 20 years reported that "on average, GM technology adoption has reduced chemical pesticide use by 37 per cent, increased crop yields by 22 per cent, and increased farmer profits by 68 per cent."


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Why growers need to continue harvest and post-harvest care of their crops, while watching for new export market restrictions.

CROP producers know they're on the front line when it comes to ensuring their crop residues stay below acceptable levels, whether it's crop protection products, mycotoxins or other substances, and that they also must keep up with new export market developments.

"As an industry, no one wants to have even one shipment that doesn't meet the requirements of the market where it's headed and therefore harms market access," notes Gord Kurbis, director of market access and trade policy at Pulse Canada.

Growers need to think continuously about everything they're doing, including conditions in storage facilities and cleaning equipment in between harvest of different crops, so crop protection products don't end up in the bin and cause problems further down the line.

"Not only does this ensure sustainable markets for all of us, but by doing this and being able to tell a buyer about the protocols you always follow on your farm, an individual farmer may get an early call from the buyer over someone else," explains Alberta Pulse Growers board member James Jackson.

Jackson stresses ensuring crops are clean applies at once to both the farm level and the national and international levels. "The issues of testing and meeting targets for residues is becoming more important in the eyes of buyers, and there's a growing complexity to it," he says. "While we have a very well-developed grain export value chain in Western Canada, like night and day in comparison with some other countries, the more we are able to demonstrate it, the better we will be able to continue to compete."

With over 90 per cent of Canadian canola exported, meeting export market residue demands is very important to canola growers as well. "The issues are becoming increasingly important for farmers, even if they may seem daunting and a long way from planting or harvesting a crop," notes Brian Innes, Canola Council of Canada vice president, government relations. "Farmers know that using best management practices for crop protection products is not an option, it's a must."

Cereals Canada president Cam Dahl believes growers should never forget many key grain safety factors are 100 per cent within their control. "As we rush to get the crop into the bin before rain and frost, we need to keep our minds on our customers while we are on the combine," he says. "It is critically important for farmers and their staff to know and understand what is on the label for every product they apply. There are no conditions where it is acceptable to not follow the label."

Cam Dahl

Indeed, shipments of Canadian grain are tested for pesticide residues in parts per billion or even parts per trillion. "Testing sensitivities at these minute levels means that even one producer not following the label can result in customer concerns or even the rejection of shipments," Dahl says. "One part per trillion is a mind-numbingly small number, but it is bigger than zero."

Jackson adds grain traceability is going to progress so that pinpointing the farm where a shipment originated will become much easier and faster than it is at present. "We already have very quick traceability in some cases and this will become standard, with samples kept at delivery points."

The Winds of Change

However, to be completely sure shipments are going to be accepted, farmers must do more than follow the label. Indeed, Kurbis points out farmers can follow label regulations and still not meet the requirements of certain markets.

"We are in a global situation where there are no MRLs for some products in some countries," he explains. "This could be because the country hasn't completed the process of establishing the MRL in question or simply that some countries don't allow certain products to be used at all. So it's imperative that growers check with their buyers about particular products." Dahl also strongly

advises talking to a buyer before using a product for the first time to make sure there are no concerns.

In the case of a country having no listed MRL for a given product – and where the default is potentially a zero threshold – Kurbis is noting a disturbing trend. Instead of countries adopting the standard global Codex MRLs created by the World Health Organization, they are moving towards their own MRLs.

"This is a big issue and the reason you'll likely be hearing more in the near future about MRLs than you have in the recent past," he notes. "The EU, U.S. and Japan, they all have their own lists, do a lot of their own testing and we know what we have to do to comply. But other countries such as Korea and India have announced they are going to be coming up with their own lists, which may make exporting grain into those markets more difficult."

Another example of a country that may present its own new restrictions is China. In some recent media reports, China has stated its intentions to lower dockage allowance on imported Canadian canola (for preventing the spread of blackleg in China's rapeseed crop), and to perhaps introduce new MRLs for glyphosate in Canadian cereals. But what will actually be put in place remains to be seen.

Kurbis would like all countries to use one single global reference like Codex, but he is one of many who believe it's not likely to occur. However, Kurbis would like to see as many countries do so as much as possible.

"Any other route creates unpredictability in the markets and that's not good for anyone," he notes. "The Canadian grain industry is getting better and better at meeting many particular standards, but we need to convince every government around the world to harmonize MRLs as much as possible. Those discussions are getting organized and hopefully they will move along productively."

Dahl concludes by encouraging growers to think about Canada's excellent reputation as they meet the often-rigorous demands of getting a crop through to harvest and into the bin. "Adhering to the guidelines will not just protect your reputation, it will ultimately protect the entire Canadian grain industry," he notes.

Ward Toma, general manager at the Alberta Canola Producers Commission, says while a variety of different methods are needed to direct Canadian growers to KeepingItClean.ca, even more could be done on this front. "There are a large number of growers, about 40,000, in Western Canada," he notes.

Alberta Wheat Commission general manager Tom Steve explains the four major crop commissions in Alberta – wheat, canola, barley and pulse – are working hard to help the province's grain sector meet the needs of export customers.

"For example, we've hired an extension coordinator, Jolene Noble, to develop and implement a program to increase producers' readiness to adapt to internationally-recognized sustainability standards and best management practices," he notes.

Treena Hein

While the technology to produce canaryseed is available, adjustments would be needed to grow the crop for human consumption.

New Opportunity for Canaryseed?

Even with a human food designation, canaryseed demand will not be increasing soon.

AS the world's largest producer of canaryseed, Saskatchewan may seem to have the market sewn up. But, work undertaken by the Canaryseed Development Commission of Saskatchewan (CDCS) to position canaryseed as human food may inadvertently provide some opportunities for Alberta seed growers.

In early 2016, canaryseed received "novel food" approval from Health Canada thanks largely to a producer levy that allowed the application to proceed.

"The birdseed market doesn't seem to be expanding, so in order to expand, we needed to find a new market," explains Kevin Hursh, the executive director of CDCS and a canaryseed grower. "Canaryseed is gluten-free, which would give it a fit in that market. It can be ground into flour for cookies or bread and would be good for whole seed uses."

Getting the human food designation is just the beginning and a great deal more work has to be done before consumers will find canaryseed snacks or products on grocery story shelves. The production of canaryseed would likely not change significantly, but management of the crop for human use will require much more care.

"There are many issues to deal with, such as determining which crop health products can be used, if the seed is for human consumption," says Pierre Hucl, a canaryseed researcher at University of Saskatchewan in Saskatoon. "We are currently examining protein content, mineral content and oil content. There's still a lot of work to be done, but we believe it could offer an alternative to consumers with allergies and it could be a replacement for sesame seeds."

While the technology to produce canaryseed is available, adjustments would be needed to grow the crop for human consumption. "If you grow wheat, you can grow canaryseed," says Hursh. "But, for human consumption, such as gluten-free, there are management requirements to maintain the designation. You have to avoid cross-contamination with crops like wheat and barley."

As well, there are two types of canaryseed – hairy and hairless. Hursh says 60 per cent of the canaryseed grown is hairy. The other 40 per cent of the market is the hairless type and it is seeds from this type that received human consumption approval.

Meanwhile, Dr. Hucl has developed a yellow canaryseed variety that is much more visually appealing than the commonly seen brown seeds, and it is anticipated the yellow seeds will be more acceptable to consumers. Hursh says commercial seed for the yellow varieties may be available in the next year or two.

"Canaryseed is also a low yielding crop," notes Dr. Hucl. "But it has high protein, about 18 per cent, and a high oil content at between seven and nine per cent. This makes it unique and could add to the appeal."

Whether for food use or the conventional birdseed market, work is underway to develop higher yielding varieties and better weed control options.

Growing canaryseed for human consumption is only the first step as the food use approval is for dehulled seed which means commercial dehulling equipment will have to be calibrated to accommodate canaryseed. There is also the issue of keeping what would amount to two types of canaryseed separate to avoid cross contamination between seed intended for the avian market and that intended for humans.

In the birdseed market, canaryseed can be stored for long periods and shipped when prices improve, but that

may not be allowed if it is for human consumption. Both Hursh and Hucl agree the food designation is merely the beginning of a long road of regulatory hurdles, food research and market development stretching to the horizon.

While Saskatchewan has a lock on the birdseed market, the crop is adapted to all soil zones and producers in other regions could certainly produce canaryseed. However, Hursh notes the birdseed market is not expanding, which is what prompted the initiative to pursue it as a human food.

Growers who might consider canaryseed as a new cropping option will have to learn the ins and outs of production. For the birdseed market, input management and equipment concerns might not be as great as what may be required when growing it for human consumption. In fact, canaryseed does not require much nitrogen, and potassium chloride is often applied for the chloride and not the potassium. The crop does require some management for aphids, weeds and disease, but there aren't many products registered for use in canaryseed. Currently, Avadex granular is the only product registered for wild oat control in canaryseed. If use for human consumption takes off, more resources may be available to improve weed, disease and pest control options.

Photos courtesy CDCS.

In early 2016, canaryseed received "novel food" approval from Health Canada thanks largely to a producer levy that allowed the application to proceed.

Prices fluctuate for canaryseed, but it tends to be competitive with returns for other cereal grains.

Despite it sounding like a lower management style crop, canaryseed production isn't for everyone.

Hucl says canaryseed is shallow rooted and therefore does best in clay soils. He says he is unsure where canaryseed is best adapted for production in Alberta, but he is convinced the Calgary/Edmonton corridor would not be a good area for canaryseed growth.

In 1995, less than 5,000 hectares of canaryseed was grown in Alberta, according to a provincial report, and that number hasn't changed much in the ensuing years with the percentage of canaryseed acres Alberta at less than five. Statistics Canada has no data for hectares of canaryseed in Alberta for 2016. Even in Saskatchewan where roughly 95 per cent of all canaryseed is grown, seeded acres fluctuate with the price. The market opportunities may have to improve substantially in order for Alberta growers to embrace canaryseed and take on the challenge of growing it for human consumption.

The industry is still in the very early days of expanding the market for canaryseed, cautions Hursh. But the promise of additional canaryseed markets and uses is exciting and has created anticipation in an industry always in search of alternate cropping options. **Rosalie I. Tennison**

Zero Tolerance Policy for Fg Unpopular

Many producers think the policy puts them at a competitive disadvantage.

AS Alberta's Agricultural Pest Act opens for consultation, many hope the current zero tolerance policy regarding *Fusarium graminearum* (Fg), which is well established in southern Alberta and spreading to central and northern Alberta, will be reconsidered.

Many believe the policy is not only unrealistic, but that it also puts Alberta farmers at a competitive disadvantage. It is hoped the policy will be reviewed when the Agricultural Pests Act is again opened for consultation.

Zero Tolerance Policy in Grain Seed Established

In Alberta, *F. graminearum* is the most prevalent species of Fusarium, which is why it was declared a pest under the Alberta Agricultural Pests Act in 1999. Following its addition to the Act, the province of Alberta developed the Alberta *Fusarium graminearum* Management Plan, which came into effect on Oct. 1, 2002. The goal of the plan was to put control strategies into place until effective disease control measures for the pathogen are developed.

The government of Alberta has stated planting diseased seed is one of the surest ways to introduce and establish the pathogen in the field, which is why one of the outcomes of the plan was the zero tolerance policy for *F. graminearum* in seed grain, including corn.

How Prevalent is Fusarium in Alberta?

Various surveys and yearly seed testing results indicate the situation surrounding Fusarium has changed since 2005 in southern Alberta and since 2012 in central Alberta. When the seed testing labs first began testing in 2001, it was difficult to find the pathogen in most areas of Alberta.

Increasingly, *F. graminearum* is being found in other parts of Alberta, especially along the Saskatchewan border and along the Hwy. 16 corridor towards areas in and around Edmonton.

"As Fg becomes more established on susceptible crop residues, there is an increasing risk of finding it more frequently in surveys and harvested grain," says Kelly Turkington, plant pathologist with Agriculture and Agri-Food Canada in Lacombe, Alta. "Unfortunately, the wheat-canola wheat-canola rotation that is typically followed, from a plant pathologist's point of view, simply does not allow enough time for decomposition and

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disappearance of infested crop residues that can act as a source of Fusarium head blight."

While numbers haven't been finalized as of yet, Michael Harding, research scientist, plant pathology with Alberta Agriculture and Forestry, says they're seeing more symptoms of Fusarium head blight this year. "This is likely due to the increase in rainfall and humidity in 2016, especially when wet conditions persisted at the time the cereal crops were flowering," he notes.

"As Fg becomes more established on susceptible crop residues, there is an increasing risk of finding it more frequently in surveys and harvested grain."

—Kelly Turkington

Is a zero tolerance policy realistic?

While the goal of the zero tolerance policy is to keep Alberta Fusarium free, some believe it to be unrealistic, especially since the risk of transfer through seed is a lot less than what it is with cross residue.

Alberta Seed Growers vice-president Ward Oatway doesn't think a zero tolerance policy is logical. "Having to throw away 0.5 per cent-infected seed in Alberta when you could haul it to Saskatchewan and seed it – and there they will take it because there it is eight per cent [tolerance]. They were going to seed it, but now they'll seed yours because it's only 0.5, and you can't do it at home," he says.

"I personally would think that with best management practices, up to a two per cent infection level is something that would be tolerable."

Oatway worries the policy puts Alberta farmers at a disadvantage, particularly when it comes to accessing new genetics. "Alberta farmers are going to find that they're not going to have access to the new genetics as fast as Saskatchewan and Manitoba due to the Fusarium on the new varieties," he notes. "It's either going to go one way or the other. It's either going to create an underground thing, or we're just going to have to wait until they get a year out there when they can provide seed that's Fusarium free."

Todd Hyra, business manager at SeCan, says there have been examples where Alberta growers have definitely missed out. "We had a general-purpose wheat a few years ago called Pasteur," he explains. "But the only source had Fusarium in it, so the only source seed growers in Alberta could use was breeder seed. And so we started with fairly large quantities in Manitoba and Saskatchewan, and Alberta had to start with breeder seed, so they were two years behind in the uptake of the variety."

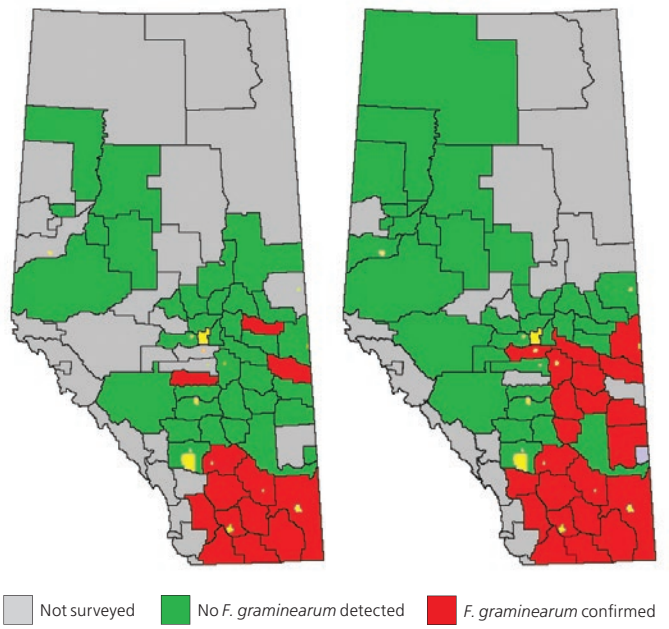
Like Oatway, Hyra doesn't think the zero tolerance policy makes sense. "When I talk to growers outside of Alberta, my recommendation is if you don't have Fusarium on the farm now, then do everything in your power not to build the levels," he says. "But if you produce seed that has one per cent in it, then what's the harm in planting seed that has one per cent in it?"

SURVEY RESULTS ALBERTA AGRICULTURE AND FORESTRY

	2010	2015
Number of positive counties	13	22
% Positive (total)	11.1%	TBD
% Positive (wheat heads)	13.6%	5.6%
% Positive (wheat stubble)	6%	27.8%
% Positive (Corn)	48.9%	71.4%
% 3-ADON (total)	9.7%	TBD
% 3-ADON (wheat)	9%	63.4%
% 3-ADON (corn)	12.1%	9.5%

2010 Alberta Distribution Map
Fusarium graminearum

2015 Alberta Distribution Map
Fusarium graminearum



Harding, however, thinks the policy still makes sense. "A small amount of *Fusarium graminearum* on seed will provide little or no improvement to Fusarium head blight management in the areas where the pathogen is firmly established and commonly found on cereal residue," he notes. "However, there are regions in the province that we rarely find *Fusarium graminearum* in our surveys. So using seed that has non-detectable levels of *Fusarium graminearum* is still a sensible approach to delaying the spread or establishment of the pathogen to those areas."

As of yet, no date has been set for the consultation, and Oatway isn't optimistic a date will be set. "I'll believe it when I see it," he says. "I hate to be pessimistic about it, but this is not the first time we've been down this road. Political will is not always very strong when it comes to things like this."

"That they're even talking about it is a positive, though," he adds. **Melanie Epp**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New Research Shows Herbicide Application Timing Influences its Efficacy

A new study by Farming Smarter proves the time of day a herbicide is applied matters, especially in crops with heavy disease pressure and/or herbicide resistance issues.

THOUGH herbicides are marketed as the "kill it dead" silver bullets to all kinds of weed problems, some herbicides' efficacy actually varies quite significantly depending on conditions at spraying time.

Because GPS guidance now allows farmers to spray day or night, Farming Smarter lead a three-year study to determine if and when the time of day a herbicide is applied would affect its resulting efficacy. The results surprised even the Farming Smarter team: not only does timing make an impact on herbicide efficacy in many crops, some of farmers' more commonly-held beliefs about spray application timing are not entirely correct.

"The time of day that herbicide is applied does impact its efficacy more than I ever expected," says Ken Coles, general manager of Farming Smarter. "But it's not as easy as just saying: 'You should spray at this time of day' or: 'You should never spray at this time of day'. I can't tell you the best time of day because the weather is always different. But there are some general guidelines that we determined from the study."

One of the most commonly held rules-of-thumb about spraying is that very early morning applications are best. While it is true wind is usually at its calmest just as the sun starts to rise, it turns out that glyphosate efficacy, especially for pre-season burndown, is also at its lowest.

"When you are doing a pre-seed application, the weather tends to be quite cool. Nights drop to less than five degrees; plants are stressed and stop actively up-taking and translocating," says Coles. "We found that very early applications tended to be the least effective. This doesn't mean glyphosate can't work first thing in the morning, but when you are looking for the probability of optimum success, it's not first thing in the morning. So I say sleep in. Don't wake at the crack of dawn."

In summer, many farmers opt to apply an in-crop herbicide in the late afternoon, thinking the heat of the day is past so plants will be more able to absorb the chemical. Wrong again, according to the Farming Smarter study. Even once the thermometer dips towards evening, the long hours of heat stress earlier in the day continue to affect a plant's ability to take in herbicide. While the decrease in glyphosate's efficacy is not quite as dramatic as is seen in cold-stressed plants at pre-seed timing, there remains visibly reduced efficacy in heat-stressed plants.

"What we found is that the duration that a plant is under stress really affects how well the herbicide works.

For the purposes of the study, researchers applied herbicide at 5 a.m., noon and midnight at multiple times throughout the growing season. This year, Coles followed up on the efficacy study with a demonstration plot in which he sprayed mid-summer

Farming Smarter's field school results showed fairly good response for many of the 2 p.m. applications, even in cases where the application occurred when the temperature was 27 C or more.

Photos: Farming Smarter

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Ken Coles, general manager of Farming Smarter, says the time of day herbicide is applied does impact its efficacy.

applications at 5 a.m., 7 a.m., 9 a.m., 2 p.m., 8 p.m., 10 p.m. and midnight.

"We wanted a visual demonstration for our field school, and was it ever. The results were strikingly different. It was almost like a bar chart in the field showing levels of efficacy. When herbicide was applied on hot days, you'd see that herbicide applied in the morning was good, but evening was bad, and then the efficacy would get better as the application got later in to the evening," says Coles.

Contrary to what one might expect, the field school results showed fairly good response for many of the 2 p.m. applications, even in cases where the application occurred when the temperature was 27 C or more.

"My thinking is that this is because the plants had only been under heat stress for an hour or two. And you see the same with cold stress at pre-seed burn-down. What is the point where the plant has been under cold stress longest? First thing in the morning, which is when you see the poorest herbicide response."

The problem, of course, is farmers are constrained logistically by the narrow window in which they can usually apply herbicide. Assuming they can pick and choose when to spray often doesn't work from an operational perspective. Therefore, because weeds respond differently to herbicides registered in different crops, Coles suggests scheduling one's spraying with crop-specific guidelines in mind, particularly if you are struggling with herbicide resistance or high weed density.

"The time of day that herbicide is applied does impact its efficacy more than I ever expected."

—Ken Coles.

"I'd spray my canolas, both Liberty and glyphosate, in the middle of the day between 10 a.m. and 2 p.m.," says Coles. "Wheat herbicides seemed to perform well under most conditions. For peas, certain kinds of products worked better in the evening, like herbicides for wild oat control.

"I don't think we have everything figured out. What we did learn more than anything was to pay attention to weather within the day and try to time accordingly, keeping in mind that plants' ability to absorb herbicide is heavily influenced by stress," says Coles. **Madeleine Baerg**

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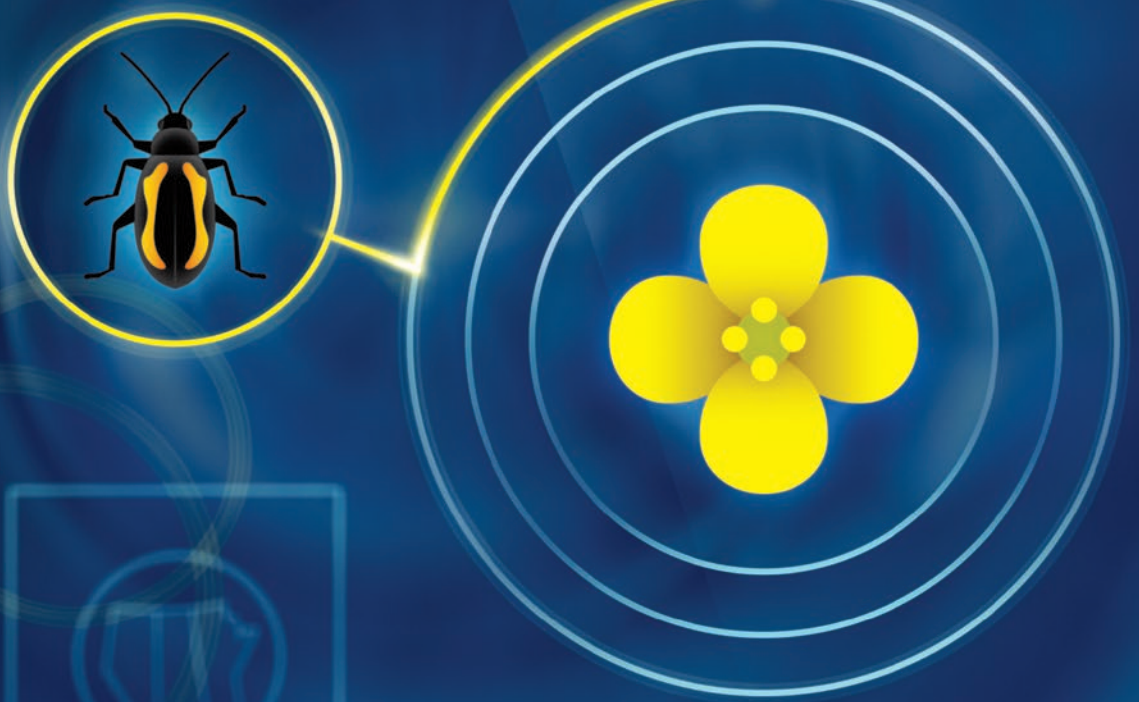

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Building for the Future

After struggling for years with an old plant that was too small, the Lougheed Seed Cleaning Co-op will open its new facility in the spring.

THE Lougheed Seed Cleaning Co-op will begin a new chapter in the spring of 2017, when its new cleaning facility officially opens.

Manager Michael Patten says the time is right to bid the current plant adieu and put the modern, high-throughput facility into operation.

"The current plant has done its time. There's only one other plant in the Alberta co-op system that's the same age as us. We just can't expand anymore in our present facility," says Patten, who's been the manager at Lougheed for 29 years. The current plant was built in 1954.

Patten is 60 now, and has seen a lot of change over the past three decades. He originally started at the plant in 1985 as a third man.

He's felt for a long time the current plant was outliving its usefulness, but its age really began to show about six years ago, he says. That's when the region faced a major ergot infestation.

"For those couple years, we were handling such high volumes. We did 1.5 million bushels in a single year, and we normally do around 500,000," he says. "It was obvious the plant was wearing out. It was around that time we began looking at building a new one."

The new plant, which will be about four times the size of the current one, is nearing completion. The co-op acquired 15 acres of land just a quarter-mile north of the current plant.

Wheat, oats, barley and peas are the co-op's bread and butter, with some rye and triticale to boot.

The new plant, which has been in construction since 2014, will have 15,000 bushels of screening capacity, 15,000 bushels clean seed capacity and 24,000 bushels of rough seed capacity.

Diversification

Lougheed is a village in central Alberta, located 94 kilometres (km) southeast of Camrose, along Hwy. 13. Only around 230 people live there, but the Lougheed Seed Cleaning Co-op enjoys a shareholder base of 130.

Historically, the plant has provided mainly seed cleaning services, and has also offered screening purchases, bagging and tagging of seed, bin rental services and tarps. That limited list of services will slowly begin to change when the new plant opens, according to Patten.

"We couldn't diversify much with the old plant, but we expect to harness that capability with the new one. We've made contacts with several companies that clean grain for export, and we're looking at the same capability for producer car loading," he says.

There's huge potential in the pedigreed seed market, he notes, and the co-op plans to capitalize on it.

"A lot of plants have been able to align themselves with seed growers or seed companies. Most seed plants clean in their

Photos courtesy Michael Patten

The new Lougheed Co-op Seed Cleaning Plant is four times the size of the old one.

The new plant has been under construction since 2014.

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region, but if you're able to tap into something outside of that local base, that seed reaches a bigger market. You draw business in and bring more clientele through your facility that way."

Progressive Approach

A progressive, thoughtful approach was crucial in designing the new plant, which is being built for efficiency and with user-friendliness in mind.

"We've incorporated new things that aren't often done. We've put two scales in, one for dumping the grain and one for loading the grain. In the past, having one scale was a big bottleneck for us," Patten says.

"That will make things easier on everyone. Other plants have tried that, but it can often be difficult to fit both scales inside the plant. We deliberately designed it so we could fit both."

Part of the co-op's progressive approach is due to the fact the six-member board is now composed of younger people, Patten says.

"The older generation can sometimes be reluctant to change," he says. "The younger people really have a good vision for the future. It's nice to have a board that's willing to listen and trusts you to make the right choice to make the plant a profitable and successful business. It's been a very pleasant experience working as a manager here."

Patten says the last two-and-a-half years have been busy and stressful, but it's all a part of helping the co-op modernize itself and prepare for the future.

The original plant was built in 1954.

"Why am I doing this when I'm ready to retire? I ask myself that every morning," he says with a chuckle.

"My retirement isn't tied to a date on the calendar. It's tied to a feeling, and the closest I came to that was when we went through those tough couple years when the ergot hit — and it was tough because we were trying to do everything with a facility that couldn't handle it. With the new plant, I've got some more left in me before I turn the reins over to someone else."

Marc Zienkiewicz

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GETTING INVOLVED in their INDUSTRY

Three Alberta seed growers are going beyond the field to make a difference in the seed sector.

THE need for new blood in the Alberta seed industry is an issue on the minds of many. Specifically, volunteer groups and boards need an influx of new members to keep them vital and generating new ideas.

Thankfully, word is getting out and seed growers are heeding the call to become active participants in steering their industry forward by joining the board of the Alberta Seed Growers (ASG).

ASG is one of seven branches of the Canadian Seed Growers' Association (CSGA). Its seed grower members work hard to maintain the standards and methods of producing clean, true-to-type, high-quality seed.

Renee Hoyme, 30, works for the Canadian Food Inspection Agency (CFIA) as an animal programs inspector in the winter and as a crop inspector in the summer. She's also heavily involved with the family business, DeWindt Seed Farm, based in Thorhild.

"My goal was to go to veterinary school, but I got a full-time job with CFIA right out of university. I moved to Grande Prairie, but eventually back to the family farm. I'm a really lucky person to be able to do what I'm doing," she says.

Last year she was asked to join the ASG board and is glad she did. She's learning a lot and feels a sense of camaraderie with her fellow seed growers.

"If you show an interest in being involved in something, people will welcome you with open arms," she says.

Perhaps more importantly, she's found she can play an important role in shaping the future of the seed industry.

"Obviously, you can't go on forever having the same people involved all the time. Bringing that new grower perspective I thought would be really helpful to the board and the members themselves," she says.

Tim Macyk feels the same way. He recently joined the ASG board as well. The 38-year-old seed grower is based in Radway, and admits he came onboard with ASG rather reluctantly.

"I got nominated, and to be honest I wasn't all that interested in joining," he says. "But my dad's been involved in agriculture for quite a while, and it dawned on me that being involved is a good chance to know what's up and coming for new genetics, which benefits our farm, and I like the idea of being involved with decision making and planning for the seed industry's future in Alberta."

Macyk is a partner in MKM Holdings growing wheat, peas, barley and oats. He formerly worked as an agronomist.

Renee Hoyme is an animal programs inspector in the winter and a crop inspector in the summer. She's also heavily involved with the family business, DeWindt Seed Farm, based in Thorhild.

Radway's Tim Macyk is a partner in MKM Holdings growing wheat, peas, barley and oats.

"Tim brings to the board a good, common-sense perspective," says ASG past president Don Sendziak, who nominated him.

"Then Don asked me if I'd stand for the nomination I almost said no," Macyk says. "I know quite a few people in the industry, and they're always encouraging my involvement, so I thought about it and decided it would be a good thing to do. I'm happy to contribute and I hope I can benefit the industry with my knowledge and background. I'm young and I have lots to learn yet, and I hope to learn a lot."

Sendziak nominated Hoyme because of her experience working in government, which he says gives her insight into forces that shape the seed industry in Alberta. She was with CFIA when Alternative Service Delivery (ASD) came into effect.

"With anything new, people are reluctant to change — and ag as a whole can be reluctant to change. I think we're moving forward as an industry," she says.

For Macyk, the need to keep the Alberta and Canadian seed industry competitive with world markets is a topic that interests him, and something he's able to gain insight into as part of the ASGA board.

"It's important to have a say in your future — everything the industry deals with influences things at the seed grower level," he says. "If you have no say in policy or where your industry is headed, you have to live with the decisions others make for you. It's crucial to have a say in where you're going."

Creating Value for Certified Seed

Influencing those decisions and creating a higher profile for certified seed is the reason 29-year-old seed grower Jason Welsh got involved in the Alberta Seed Growers, too. Welsh has been a seed grower for six years in Milk River, where his family operates Sleepy Hollow Seeds and grows pedigreed wheat, barley, peas and grass seed. He is a graduate of the University of Alberta, where he did a double major in crop science and agricultural business.

"It's a good feeling to know you have some input into the direction the Alberta seed industry is going and into some of the issues that concern the seed industry," Welsh says.

"For me, it's important to gain a better understanding of some of the things that go on within the seed industry that I wasn't aware of before. I'm really enjoying learning about how we can create more value for certified seed in the province."

Welsh's grandfather started the seed farm, and he currently works with his dad and wife Randi to help provide Alberta farmers with quality seed. According to Welsh, joining the ASG board helps him become better at doing that.

Jason Welsh is a seed grower in Milk River, where his family operates Sleepy Hollow Seeds and grows pedigreed wheat, barley, peas and grass seed.

"It really helps me network and talk to other seed growers and people in the industry. The amount of knowledge you gain is incredible, and I wouldn't be able to gain it if I hadn't joined the board. You can't get those opportunities anywhere else. It's not a massive time commitment, and just being there helps you gain knowledge and you meet so many people you otherwise would not have met. It's worth it."

Both Macyk and Hoyme encourage others to get involved, too.

"The board does a lot in the background that I would have never known otherwise," Hoyme says. "Everyone puts a lot of time into it. A lot of effort is put into going to meetings and meeting with other groups. It's important."

Macyk agrees.

"Networking is a big benefit of joining — getting to meet some of the bright minds in the seed industry. I hope to gain some knowledge of the interconnectedness of the industry with some of the other boards and things going on in agriculture," he adds.

Marc Zienkiewicz

PGDC Helps Fuel an Industry

With 52 lines supported for registration at its 2016 annual meeting, the Prairie Grain Development Committee is ensuring the marketplace is provided with the newest and most promising cultivars.

NEW varieties are the fuel that keeps the seed and agriculture industries going, and the Prairie Grain Development Committee (PGDC) helped provide that fuel at its annual meeting Feb. 22-25 in Saskatoon, Sask. More than 50 new cultivars in four different crop categories were recommended for registration, delivering even more options for stakeholders throughout the agriculture sector and beyond.

Twenty-seven cultivars were considered for recommendation by the wheat, rye and triticale committee (PRCWRT), with 25 of them being recommended for registration, according to committee chair Curtis Pozniak. This is the third year that the PRCWRT has instituted a new voting procedure, where candidate cultivars endorsed by three expert evaluation teams (agronomy, disease and quality) are automatically endorsed and supported for cultivar registration.

Twenty-two of the candidate cultivars considered were automatically endorsed, with the remaining being considered by the cultivar voting panel voting. This panel consists of 22 members representing the wheat value chain, and it is their responsibility to weight the positive attributes of a cultivar against potential deficiencies that have been flagged by one or more of the three evaluation teams, Pozniak says.

Of the five that were referred to the CVP, two were tabled until next year, and two were supported for interim registration for a three-year period.

Two candidate cultivars approved by PRCWRT were in response to the modernization of the Canadian wheat class system. Under the modernization plan, two new wheat classes will come into effect on Aug. 1: Canada Northern Hard Red (CNHR) and Canada Western Special Purpose (CWSP). Three wheat classes will be eliminated: Canada Western Interim Wheat (CWIW), Canada Western General Purpose (CWGP), and Canada Western Feed (CWF).

"For this year, the PRCWRT considered two cultivars that were evaluated for the CWRS class, but their end-use functionality was better-suited to other wheat classes. Our committee is committed to flexibility, so we decided that it would be best to set aside our normal voting procedures to consider these lines for either the CNHR or CPS classes," he says.

Glen Hawkins, chair of the PGDC pulse and special crops committee, speaks to an attendee of the PGDC annual meeting held in Saskatoon Feb. 22-25.

"If we had not set aside our rules, these two cultivars would likely have not been considered, and an opportunity for producers may have been lost. This confirms our commitment to transparency and flexibility in our current operating procedures, and supports our efforts to ensure opportunities for western Canadian wheat producers."

One of these cultivars was BW968, which failed to receive a positive recommendation in 2015 for CWRS, was supported as a CPS cultivar. BW968 is a spring wheat bred by Agriculture and Agri-Food Canada's Richard Cuthbert.

Beans, Peas, Lentils and Canarygrass

Fifteen lines were recommended for registration by the pulse and special crops committee (PRCPSC). They included six bean lines, four pea lines, four lentil lines and one canary grass line.

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Prairie Grain Development Committee chair Tom Fetch says 271 people showed up for this year's annual meeting.

"It's a bit less than in previous years, but more diverse," says committee chair Glen Hawkins.

The beans lines were made up of two cranberry, two yellow, one pinto and one flor de junio. All pea lines were yellow, while lentil lines consisted of one French green, one large green, and two small red. The sole canarygrass line was a glabrous type.

"We cover all these crops because they have different growing niches in Western Canada, and that's only increasing," Hawkins says. "We live in a global market now, so our ability to get products pretty much anywhere we want to get them in the world becomes easier every day, and that provides opportunity to develop niche products that can fit those markets. Lentil is a good example — there are so many types and classes of lentils bred for specific markets."

The marketing potential of pulses was made clear to attendees of the PGDC annual meeting — 271 people showed up this year, according to PGDC chair Tom Fetch — when AGT Foods president and CEO Murad Al-Katib spoke during the plenary session. Based in Regina, AGT Foods is one of the largest suppliers of pulses, staple foods and food ingredients in the world.

"Canada is not the only game in town in cereal production anymore, but if I ask the farmers out there where they've made money over the last decade, many have made money on their pulse rotations. They've made money on their canola. This sustainable cereal-oilseed-pulse rotation is one that has shown great economic benefit to Saskatchewan and to western Canadian agriculture," he says.

"In 2003 when we started up our red lentil splitting plant in Regina, the whole world said, 'You will never succeed, because Canada is a tertiary player in red lentils in the world.' Today we produce and export 65 per cent of the world's lentils, so Canada is the centre of the world when it comes to that particular commodity today."

Al-Katib says new varieties are the lifeblood of his business, referring in particular to the King Red lentil developed by Bert Vandenberg of the University of Saskatchewan. It's the biggest red lentil in the world, and sold by AGT in Sri Lanka.

"It's a niche variety, but we took two kilos of seed and have

50,000 acres of production now. It's an example of how we can take this research and [use it to create new products]."

Changes Coming for Oilseeds Committee

Four flax lines were considered and ultimately recommended for registration by the oilseeds committee (PRCO), according to chair Daryl Rex — three brown-seeded flax cultivars and one yellow-seeded cultivar. Compared to last year that's down quite a bit, as there were more than 10 lines considered for registration in 2015.

Changes are in store for the flax and mustard-breeding sector, Rex noted. Multiple breeding organizations used to be involved, but "we're basically ending up with one breeding entity for each now," Rex says.

Flax used to be bred by Agriculture and Agri-Food Canada and Crop Production Services, but both are winding down their flax breeding programs and leaving just the Crop Development Centre at the University of Saskatchewan to do the work. Viterra used to breed mustard along with AAFC, but he noted that just AAFC will be left in the mustard breeding ring.

In fact, the PRCO discussed alterations to its operating procedures which would see the committee split into two separate bodies, one that deals with flax and the other dealing with condiment mustard. Both the flax and mustard groups decided to maintain the status quo for another year. The mustard group will have a small subcommittee formed to explore what options may be available to them and report back to the group later in the year.

"In a way it's nothing new for us — at one point in time the oilseeds committee handled four or five crop types including sunflower and safflower," he says.

Five years ago its mandate was changed to just dealing with flax and condiment mustard, he adds.

Breeding Barley for Beer

Four barley and four oat lines were recommended for registration by the oat and barley committee, according to committee secretary Pat Juskiw. Out of the four oat lines, three were milling oats and one was bred for equine feed. All four barley lines were for malting barley, with two recommended for full registration and two for interim registration.

As usual, malt quality for brewing was a big topic of discussion, according to committee chair Rich Joy.

"In regard to what brewers want, they all want something different," he says.

"The big growth in the brewing industry right now is the craft market, and it's looking for different things depending who you talk to. Realistically, it's something the North American varieties are having difficulty delivering. Very low protein, low enzymes, high extract-type barley. What that does is it provides a different type of malt quality profile compared to higher protein varieties we currently offer. Our breeders are doing a great job to ensure those types of varieties are being bred if they can be."

Current barleys commonly used by brewers are getting old, he added, and it's time for some new ones to take over and replace those time-honoured malting barley varieties.

"We've had AC Metcalfe and CDC Copeland since the late 1990s. Some of those new ones coming up now are looking positive. I'm happy to say we're getting new varieties that will probably fill some of the niches left by Metcalfe and Copeland when they eventually go away."

Daryl Rex, chair of the PGDC oilseeds committee, says the committee could one day split into two separate ones dealing with flax and condiment mustard.

World-renowned Canadian wheat breeder Ron DePauw spoke out against government-imposed limits on how many voting members can sit on the PGDC's four recommending committees

WCC/RRC Results

It's not a part of the PGDC, but an additional 97 lines of canola/rapeseed are being recommended for registration by the Western Canada Canola/Rapeseed Recommending Committee, according to chair Raymond Gadoua.

Twenty-six lines were recommended for interim registration at the group's meeting in February — four Clearfield, two Glyphosate Trulflex Roundup Ready, two Liberty/Roundup, and 18 Roundup lines. The remaining 71 were given full recommendation — five Clearfield, four Glufosinate Ammonium-RF3, five Glyphosate-Optimum GLY, six Glyphosate Truflex Roundup Ready, 13 Liberty, two Liberty/Roundup and 36 Roundup lines.

The two malt lines given full registration were TR13609, a variety submitted by Juskiw that enjoys a yield 112 per cent of AC Metcalfe with later anthesis and maturity, higher kernel weight and per cent plump, similar test weight and lower DON levels than the checks. TR13812, put forth by the Crop Development Centre's Aaron Beattie, is a low-protein variety with the LOXless trait.

Opposition to 'Modernization'

While numerous issues affecting the industry were discussed at the annual meeting, a big topic of discussion was the new streamlining procedures for crop-specific recommending committees introduced by the federal government.

Under the changes, recommending committees are being asked to reduce their number of voting members in an effort to streamline the process and give "Canadian farmers faster access to the newest cutting-edge varieties," according to the AAFC website.

The plan received considerable opposition at the PGDC meeting, and attendees were given a chance to express their concern when AAFC representatives Mike Scheffel and Mark Forhan addressed the four recommending committees.

Forhan spoke to the wheat, rye and triticale committee, which currently has 75 voting members. Forhan says that while he wasn't prepared to offer up a specific number in terms of how many voting members the committee should have, he says 75 is too many and should be reduced.

"When we set out to come up with this modernization plan, the message that came back was that these [committees] are large, onerous groups that are hard for newcomers to decipher," Forhan says. "All you're doing is reducing the number of people voting. It's totally up to you to decide who gets to vote and what their expertise is."

Ron Depauw, a world-renowned retired wheat breeder who's now a science adviser for SeCan, was one of many who says he fears reducing the number of voting committee members would weaken the committees and place more decision-making power in the hands of fewer people.

"It's crucial to give people an opportunity to express their point of view. That's super-important," DePauw says.

Rich Joy, chair of the PGDC oats and barley committee, says the big growth in the brewing industry right now is the craft market, and it's looking for different things depending who you talk to.

At the oat and barley committee meeting, Juskiw asked for a show of hands as to who would not attend future PGDC meetings if they weren't able to vote. Many hands in the room went up.

"Just because this process might be hard to understand the first time you show up, is that a reason to change it? Do we change this process to accommodate that person's lack of knowledge? Those very people who might have a hard time understanding the process today, in a few years they could be the next chair or secretary of the committee," DePauw adds.

"Winter wheat is not like spring wheat and neither one is like durum wheat. The key is to have an open, transparent and predictable process. We don't change the parliamentary process to accommodate first-time MPs, rather they are assisted to understand the democratic process." **Marc Zienkiewicz**

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abbreviations

DISEASE RESISTANCE
S - Susceptible
MS - Moderately Susceptible
MR - Moderate Resistance
R - Resistant
I - Intermediate

OTHER
HU - Heat Units
CHU - Crop Heat Units
CPT - Canola Performance Trials
SCN - Soybean Cyst Nematode
WCC/RCC - Western Canada Canola/ Rapeseed Recommending Committee

TRAITS
CR – Clubroot Resistance
GENVT2P RIB - Genuity VT Double Pro RIB Complete
GENRR2Y - Genuity Roundup Ready 2 Yield
GENRR2X/SCN - Genuity® Roundup Ready 2 Xtend
LL - Liberty Link
RR - Roundup Ready
RR2 - Roundup Ready 2
RR2Y - Roundup Ready 2 Yield
SCL - Sclerotinia Resistance
SS - SmartStax

WHEAT
CNHR - Canada Northern Hard Red
CPSR - Canada Prairie Spring Red
CWAD - Canada Western Amber Durum
CWHRW – Canada Western Hard Red Winter
CWRS - Canada Western Red Spring

ALFALFA

ALFALFA

Company		Variety Name/Type	Use (Hay or Grazing)	Winter Hardiness	Merit Tested in Canada (Y/N)	Highlights
NORTHSTAR SEED	Northstar Seed northstarseed.com 1-800-430-5955	Perfection	FD 4	Very (2.1)	HR to Anthracnose HR to Bacterial wilt HR to Fusarium HR to PRR R to Aphanomyces R to Verticillium Wilt	StandFast variety Rapid regrowth High forage yield

BARLEY

BARLEY

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
CANTERRA SEEDS	CANTERRA SEEDS canterra.com 1-866-744-4321	Canmore General Purpose 2-Row	Medium	102% of Xena	MR to Scald	Improved yields and standability vs. Xena Higher % Plumps and test weight For the feed market as well as the developing shochu market

CANOLA

CANOLA

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
BAYER InVigor	Bayer CropScience cropscience.bayer.ca 1-888-283-6847	InVigor L233P Hybrid *napus* LL	Over 3 days earlier than the checks	108.8% of the checks (InVigor 5440 & Pioneer 45H29) in 2014/2015 WCC/RRC trials	R to Blackleg	New evolution hybrid with the pod shatter reduction trait. This early-maturing, high yielding hybrid provides greater harvest flexibility for growers who want help managing their day-to-day workload during the busy harvest season
		InVigor L230 Hybrid *napus* LL	Over 3 days earlier than the checks	103.9% of the checks (InVigor 5440 and Pioneer® 45H29) in 2014/2015 WCC/RRC trials	R to Blackleg	Early-maturing InVigor L230 displays outstanding yield potential with exceptional lodging resistance. This new evolution hybrid is ideal for growers who prefer an early maturing hybrid
Cargill VICTORY HYBRID CANOLA	CARGILL victorycanola.com 1-888-855-8558	VICTORY® V-Class™ V14-1 Hybrid *napus* GENRR	1 day later than checks *Co-op checks 5440 and 45H29	110% of 74-44 BL 107% of VICTORY® 12-1 [1]First year co-op trials (all-zones), 2014	Multi-genic blackleg resistance delivering an R rating R to Clubroot R to Fusarium Wilt	A breakthrough hybrid that takes yields to the next level. Part of the Cargill Specialty Canola Program, V14-1 delivers high-performance VICTORY® V14-1 is clubroot resistant and has a unique multi-genic blackleg resistance package. It has exceptional standability and simplifies harvest management offering bigger yields and higher returns Contact your Cargill representative or independent dealer for more information and visit victorycanola.com
Crop Production Services Proven SEED	Crop Production Services Proven Seed provenseed.ca	PV 540 G Hybrid *napus* GENRR	Mid/Late	109% of PV 530 G	Very Strong R to Blackleg	Yield leading and yield stable World-class blackleg resistance Superior ease of harvest
		XCEED X122 CL Hybrid *juncea* Clearfield	Mid/Late	100% of VR 9560 CL	R to Blackleg	Non-GMO with premium contracts available Bred to tolerate heat and drought Improved pod shatter resistance for straight-cut performance


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CANOLA

Crop Production Services / ProVen SEED	Crop Production Services Proven Seed provenseed.ca	PV 560 GM Hybrid *napus* GENRR	Mid/Late	105% of PV 530 G	MR to Blackleg	High yield Pioneer Protector HarvestMax traits for harvest flexibility
		PV 581 GC Hybrid *napus* GENRR	Mid/Late	111% of PV 530 G	R to Clubroot R to Blackleg	High-yielding with very good standability Pioneer Protector clubroot resistance traits
		PV 590 GCS Hybrid *napus* GENRR	Mid	99% of PV 530 G	R to Sclerotinia R to Clubroot R to Blackleg	Excellent yield potential Pioneer Protector Plus with sclerotinia and clubroot resistance traits
MONSANTO / DEKALB	DEKALB DEKALB.ca 1-800-667-4944	75-45 RR	Early *-1.8 relative maturity to 74-44 BL *Source: 2010-2015 Monsanto Field Scale and Breeding Trials across Western Canada	103.3% of 45H33*	R to Blackleg R to Fusarium Wilt	Early maturity enables growing a mix of hybrids which allows spreading out field management operations Good plant height and higher pod set
		75-65 RR	Early-Mid *0.5 relative maturity to 74-44 BL *Source: 2010-2015 Monsanto Field Scale and Breeding Trials across Western Canada	101.6% of 45H33*	R to Blackleg R to Fusarium Wilt	Strong pod integrity allows for straight cutting or delayed swathing Fast drydown when straight cut and excellent combining ease
		75-42 CR	Early **-0.23 relative maturity to 74-44 BL **Source: 2016 Monsanto Field Scale Trials as of October 12, 2016	102.4% of 45H33**	R to Clubroot R to Blackleg R to Fusarium Wilt	Clubroot resistant hybrid with early maturity advantage
DUPONT PIONEER	DuPont Pioneer pioneer.com/canada (306) 385-3001	45CS40 Hybrid *napus* RR/SCL/CR	Mid-maturity	99.8% of Pioneer® hybrid 45H29 in 52 large scale Proving Ground™ grower managed field trials across Western Canada in 2015	R to Blackleg R to Fusarium Wilt R to Scleortinia R to Clubroot	New canola hybrid with built-in resistance to both clubroot and sclerotinia - contains the Pioneer Protector® Plus traits Excellent early growth and yield potential Very good standability for ease of harvest Available exclusively from Pioneer Hi-Bred sales representatives in Western Canada

CANOLA

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
DUPONT PIONEER	DuPont Pioneer pioneer.com/canada (306) 385-3001	45M35 Hybrid *napus* RR	MID MATURITY	105.8% of Pioneer® hybrid 45H29 in 31 large scale, straight cut Proving Ground™ grower managed field trials across Western Canada in 2015	MR to Blackleg R to Fusarium Wilt	New canola hybrid with built-in resistance to pod shatter - contains the Pioneer Protector® HarvestMax traits for harvest flexibility (can be straight cut or swathed) Excellent early growth, very good standability and exceptional yield potential Available exclusively from Pioneer Hi-Bred sales representatives in Western Canada
Nexera CANOLA	Dow AgroSciences NEXERACANOLA.CA 1-800-667-3852	1024 RR Roundup Ready	-1 DAY 1012 RR	109% 1012 RR	R for Clubroot	Medium height Excellent standability Clubroot resistance
		2024 CL Clearfield	0 DAYS 2012 CL	105% 2012 CL	R for Blackleg	Medium height Demonstrates strong pod shatter resistance and can be considered for straight cutting Multi-genic blackleg resistance

CORN

CORN

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
Crop Production Services ProVen SEED	Crop Production Services Proven Seed provenseed.ca	PV 60075 RIB RR/VT Double Pro Grain/Early Silage	2150 HU	Excellent 104.6% of check	Goss's Wilt European Corn Borer	Good spring vigour & early to flower Top class root & stalk strength Excellent grain dry down, reducing maturity risk
		PV 60075 RR RR Grain/Early Silage	2125 HU	Excellent 104.6% of check	Goss's Wilt	Good spring vigour & early to flower Top class root & stalk strength Excellent grain dry down, reducing maturity risk
MONSANTO DEKALB	DEKALB DEKALB.ca 1-800-667-4944	DKC34-57RIB	2550 CHU	High	GENVT2P RIB	Strong performance in all yield environments Flowering and drydown on target for maturity Performs best on loamy soils
		DKC35-88RIB	2600 CHU	Excellent	GENVT2P RIB	Excellent yield potential in all soil types and yield environments Flowers and dries down true to relative maturity Excellent stalks and roots
		DKC38-55RIB	2675 CHU	High	GENVT2P RIB	Medium statured hybrid that flowers early for its relative maturity Performs best on loamy soils Plant at medium to high populations for best results

CORN

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
Dow Seeds	Dow Seeds DowSeeds.ca 1-800-265-7403	BMR90B94 GM Hybrid Corn Silage	2600 HU	Good	Herculex Extra	Brown mid rib silage hybrid with above average fibre digestability Excellent standability and good stress tolerance Solid plant agronomics will support high plant densities and narrow row widths
		TMF8106RA GM Hybrid Corn Silage/Grazing	2425 HU	Excellent	SmartStax Refuge Advanced	Tall plant structure and big yields, with consistent ear fill and nice appeal Very good digestibility and starch scores Semi-flex ear provides flexibility across variable plant densities
		DS80A27 GM Hybrid Dual Purpose/ Grazing	2350 HU	Excellent	SmartStax Refuge	Excellent grain yield from large ears with consistent ear fill Medium tall plant type produces good silage tonneage when used for silage Strong emergence and early vigour adapts well to cool planting conditions
PICKSEED	PICKSEED pickseed.com/ WCanada 1-800-265-3925	PS 2320RR Grain/Silage	2200 CHU 76 RM	Excellent	RR2	Early flowering hybrid with a flint kernel grain type Very good seedling vigour and excellent stalk strength Tall plant height
		PS 2332 Grain/Silage	2250 CHU 77 RM	Very Good		Early flowering hybrid with a flint kernel grain type Uniform, consistent ear development down the row Medium-tall plant height
PRIDE SEEDS	PRIDE Seeds prideseed.com 1-800-265-5280	A4099RR GM Hybrid Food/Feed	2125 CHU	Excellent grain yield	Roundup Ready 2 Good Goss's wilt rating	RR2 for grain useage. Featuring early pollination and finish. Very nice grain quality and consistency. Rapid emergence and aggressive seedling vigour for a fast, early season start
		A5432G2 RIB GM Hybrid Food/Feed	2325 - 2475 CHU	High starch content, digestibility and energy	VT2P RIB R = ECB Very good Goss's wilt rating	Impressive benchmark product family for silage and high moisture corn use. Very high starch content with very good tonnage potential. Great drought and stress tolerance. Early flowering with excellent health, digestibility and milk and beef/acre scores.
maizex	Maizex maizex.com 1-877-682-1720	MZ 1340DBR VT Double Pro Grain Hybrid	2150 CHU 73RM			Ultra early flowering hybrid with exceptional grain quality and test weight. Industry leading early season vigour adapted for short seasons Open husks at maturity aid rapid grain dry-down. Responds to increased population Adapted in and north of its maturity zone
		MZ 1482R RR2 Silage Hybrid	2050 CHU 71 RM		RR2	Solid agronomics. Rapid spring vigour transforms into early flowering plants with exceptional stalk strength. Ears are 16-20 rows around with deep kernels. Position in zone at moderate to higher populations As a silage option, MZ 1482R provides large robust plants with exceptional starch content and availability

FLAX

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
Crop Production Services ProVen SEED	Crop Production Services Proven Seed provenseed.ca	WestLin 72	+2.5 days of CDC Bethune	102% of CDC Bethune		Exceptional yield performance & yield stability Good disease resistance Strong oil profile

FORAGES

Company		Variety Name/Type	Use (Hay or Grazing)	Winter Hardiness	Merit Tested in Canada (Y/N)	Highlights
NORTHSTAR SEED	Northstar Seed northstarseed.com 1-800-430-5955	AAC Mountainview Sainfoin	Hay/Grazing	Very	Yes Developed by AAFC	Multi-cut Excellent forage production

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
PICKSEED	PICKSEED pickseed.com/ WCanada 1-800-265-3925	Danergo Annual Ryegrass Italian Tetraploid	Hay	N/A	Yes, Replicated Private Trials	High yielding Will not set seed in the year of sowing High disease resistance
		Fojtan Festulolium Fescue type.	Hay	Very Good	Yes, Replicated Private Trials	Tall fescue x perennial ryegrass High yielding Very persistent
		Renegade Red Clover Multi-Cut Diploid	Hay	Very Good	Yes, Replicated Private Trials	High yielding Early flowering Improved disease resistance
		Silvester White Clover Ladino type.	Hay	Excellent	Yes, Replicated Private Trials	Large leaved, Ladino type Vigourous and high yielding Good disease tolerance

OATS

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
FPGenetics	FP Genetics Inc. Canada 1-877-791-1045	CDC Ruffian Milling	M (same as AC Morgan)	110% CDC Dancer	R to Smut I to Crown Rust	Strong straw High yield Excellent milling attributes

PEAS

Company		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
CANTERRA SEEDS	CANTERRA SEEDS canterra.com 1-866-744-4321	AAC Carver Yellow Pea	Early	10% of AC Agassiz	R to Powdery Mildew	Suited to every situation with early maturity AND great yields Very good lodging resistance

PEAS

Company/Logo		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
MASTIN SEEDS	Mastin Seeds mastinseeds.com 403-556-2609	AAC Peace River Field Pea	Very Early -6 days Eclipse	92% CDC Amarillo 101% Eclipse	R to Powdery Mildew	Much like CDC Meadow but earlier, developed by AAFC Beaverlodge in Peace River farming region Subcontracted from Hadland Seed Farms; available from both Hadland Seeds and Mastin Seeds Ideal the year before winter wheat; harvested in time to fall seed winter cereal. Limited supply available in 2017

SOYBEANS

SOYBEAN

Company/Logo		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
Crop Production Services Proven SEED	Crop Production Services Proven Seed provenseed.ca	PV 10s005 RR2 GENRR2Y	2425 HU	Ultra-high yielding 114% of mean	White mould tolerance Good IDC tolerance	Excellent standability for ease of harvest Top class white mould tolerance Fits wide and narrow row production
MONSANTO DEKALB	DEKALB DEKALB.ca 1-800-667-4944	22-61RY	2275 CHU	High	GENRR2Y	Medium-to-tall plant with very good emergence Well suited to all soil types and row widths Very good Phytopthora Root Rot tolerance and aggressive growth will make it a great fit for tougher growing conditions
		DKB005-52	2425 CHU	Excellent	GENRR2X/SCN	Medium height with very good standability Excellent agronomic package. Very good White Mould tolerance, Soybean Cyst Nematode resistant, excellent tolerance to Phytopthora Root Rot Well suited to all soil types and row widths
DUPONT PIONEER	DuPont Pioneer pioneer.com/canada (306) 385-3001	P005T13R GM Hybrid Food/Feed	2400 HU	Pioneer® variety P005T13R was 3.0 bu/ac higher with 74% Wins over Pioneer® variety P002T04R across 19 large scale Proving Ground™ field trials in Western Canada (2015-2016)	Glyphosate tolerant 1C phytophthora resistance	New early soybean with excellent emergence and yield potential with flexibility for wide row planting Very good standability and lodging scores for ease of harvest Very good early emergence for better ground cover
		P006T46R GM Hybrid Food/Feed	2425 HU	Pioneer® variety P006T78R was 1.5 bu/ac higher with 71% Wins over Pioneer® variety P006T78R across 35 large scale Proving Ground™ field trials in Western Canada (2015-2016)	Glyphosate tolerant 1C phytophthora resistance	A very consistent, high yielding soybean with very good standability and handles heavier soils well Above average early emergence for better ground cover Very good lodging scores for ease of harvest
NorthStar Genetics	NorthStar Genetics northstargenetics.com/ca/ (204) 262-2425	NSC Leroy RR2Y RR2Y	2225 HU	Very Good	Good resistance to IDC and White Mold	Super ultra-early maturing variety Great for new growers in Alberta Tall and upright plant structure
		NSC Watson RR2Y RR2Y	2250 HU	Exceptional	Very strong resistance to IDC	Very Strong early-season vigor Cluster pods for exceptional yield Very good height due to extended lower internode
		NSC EXP 114 RR2X RR2X	2250/2275 HU	Excellent	Does very well in reduced tillage	Tall growth habit Dicamba tolerant trait to manage glyphosate resistance Ultra early maturity
		NSC Austin RR2Y RR2Y	2375 HU	Very High Yield	Superior white mold resistance	Well suited to highly productive soils Very strong yielding variety Mid-season maturity
PRIDE SEEDS	PRIDE Seeds prideseed.com 1-800-265-5280	PS 00095 R2 * RR2Y	2275 CHU	Outstanding	Above Average IDC tolerance Excellent white mould resistance	New introduction for the late 000 maturity group with the RR2Y trait. This variety presents an opportunity into the very short season growing areas. Best performance on narrow row widths. Above average IDC rating. Excellent white mould resistance and good field tolerance to Phytophthora root rot. *Pending Registration

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SOYBEAN

Quarry Seed Prograin quarryseed.com	Torro R2	2375 CHU	Excellent	Very good IDC tolerance Good Sclerotinia tolerance	Medium-sized plant with dark green foilage Above-average standability Responds well to high population
	Kosmo R2	2450 CHU	Excellent	Good IDC tolerance Good Sclerotinia tolerance	Excellent yield potential and standability perfect for short season areas Excellent vigour, tall plant and good flower fertility
	CBZ814A1 R2X	2250 CHU	Excellent	Good IDC tolerance Good stability/adaptability	very good yield potential for its maturity group tall plant with aggressive development good bushing capacity and excellent vigour
Thunder Seed Canada thunderseed.com 1-888-684-8633	TH 87003R2YX	2375 HU	High Yield	Excellent IDC tolerance	Great disease package Works wel in wide rows Tall aggressive variety
	TH 87000R2X	2250 HU	High Yield Potential		Ultra early for Western Canada Good spring vigour Tall, aggressive, works well in reduced tillage

WHEAT

WHEAT

Company/Logo		Variety Name/Type	Maturity	Yield	Disease/Pest Resistance	Highlights
Alliance Seed allianceseed.com 1-877-270-2890	AAC Prevail VB CWRS	+1 day of AC Unity	101% of AC Unity VB	I to FHB, MR to Stem Rust R to Leaf and Stripe Rust	Midge tolerant Improved standability to AC Unity Consistently Higher yield than checks
	SY479 VB CWRS	+1 day of AC Unity	91 % of AC Unity VB	I for FHB R to Leaf Rust	Midge tolerant Very high grain protein Good Standability in Midge tolerant Segment
	SY Rowyn CPSR	1 day earlier than 5700PR	115 % of 5700PR	MR to FHB, R to Stem and Leaf Rust, MR to Stripe Rust	Production contract through P&H, Paterson Grain and NWT Unique marketing opportunity
CANTERRA SEEDS canterra.com 1-866-744-4321	AAC Cameron VB CWRS (Midge Tolerant)	Medium -1 day of Unity VB	105% of Unity VB	MR to Leaf and Stem Rust I to FHB	Significantly better lodging resistance than Unity VB Resistant to the orange blossom wheat midge. Awned
	AAC Concord CNHR	Medium	120% of Lillian	R to Leaf and Stem Rust MR to FHB	Resistant to the wheat stem sawfly (very solid stems) Stronger FHB resistance than Lillian High test weight and seed weight
Crop Production Services Proven Seed provenseed.ca	CDC Carbide CWAD	Mid-maturity	103% of Strongfield	Midge-tolerant R to Rusts (stem, leaf, stripe) MS to FHB	Midge-tolerance with improved yield and agronomics Strong protein and test weight Holds its colour and quality
SeCan Secan.com 1-800-665-7333	AAC Spitfire CWAD	Equal to AC® Strongfield	110% of AC® Strongfield	S to FHB	AAC Spitfire is 2 cm shorter than AC® Strongfield and has improved lodging resistance along with top yield An excellent replacement for AC® Strongfield Available through SeCan Members
	AAC Tradition CNHR	Equal to AC® Carberry	109% of AC® Carberry	I to FHB	AAC Tradition is 5 cm taller than AC® Carberry. Intermediate rating for FHB Selected for improved yield under "Organic" production systems. Available through SeCan Members
	AAC Jatharia CWRS	-2 days to AC Carberry	107% of AC® Carberry	Midge tolerant I to FHB	16cm taller than AC® Carberry An excellent replacement for AC® Unity VB Available through SeCan Members
	CDC Bradwell CWRS	-2 days to AC Carberry	102% of AC® Carberry	I to FHB	7 cm taller than AC® Carberry Very good lodging resistance, I to FHB, Egg layiing deterence against wheat midge Available through SeCan Members
	AAC Elevate CWHRW		107% of CDC Buteo	MS to Stripe Rust R to Leaf Rust R to Stem Rust	8 cm shorter than CDC Buteo with very good lodging resistance Good winter hardiness along with leaf and stem rust resistance Available through SeCan Members

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In the new post-patent environment, farmers and seedsmen are learning there's more than meets the eye.

IN 2011, Monsanto's patent on the first generation Roundup Ready trait in soybeans expired. When this happened, no one was sure what the market would be for the 20-year-old technology. But in the past four years, the seed industry has gotten to see how the market treats that product ... and in some cases, it's not good.

We're seeing unscrupulous sellers, looking to make a quick profit by selling illegitimate seed, says Lorne Hadley of the Canadian Plant Technology Agency.

Plant breeders and seed companies have worked diligently to provide farmers with quality seed, pushing the yield envelope. Hadley says farmers recognize these achievements but are being pressured by the current economic environment of depressed commodity prices.

It's easy to see how farmers could be enticed into buying lower cost seed, but Hadley says these "deals" come with a hefty price. "One farmer was offered soybean seed at a large discount, but this lower-quality seed ended up costing him hundreds of dollars per acre in lost yield," Hadley says.

After the sell, profit-seekers pack up, leaving farmers with no support. The concern for the seed industry, Hadley says, is that

"One farmer was offered soybean seed at a large discount, but this lower-quality seed ended up costing him hundreds of dollars per acre in lost yield."

—Lorne Hadley

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these illegitimate sellers lower the market for legitimate ones who work to forge strong relationships with farmers.

Common seed in Canada is required to be of a registered variety to be sold, but illegitimate sellers can drive across the border, pick up a load of beans and sell them, Hadley says. "We know that the herbicide-tolerant trait is present in a large percentage of the soybean crop," he says. "But if farmers buy common seed, they don't know if they are getting Roundup Ready technology or Roundup Ready 2 — which is still under patent protection. It has become a buyer beware system."

Hadley says companies want farmers to be successful and view customers as long-term partners.

But the bigger concern is the potential market disruption, says Darrel Armstrong, stewardship lead for Monsanto Canada. The original Roundup Ready trait in soybeans is the first large acreage product to come off patent; however, more technologies are scheduled to follow. Although Monsanto has committed to maintaining approvals in key export markets for the original Roundup Ready trait in soybean for a period of time, there is the question about who will maintain these approvals for any trait once the patent has expired and the developer no longer wants to sell the product. Once the import approval lapses or expires in a key market, that can put exports to the market at risk, Armstrong says.

"Additionally many technologies have specific stewardship needs that help protect the long-term durability," he says. "With off patent technology, the grower may not receive the correct guidance, increasing the risk the technology may fail, which could also impact similar technologies. If that happens, no one wins."

Avoiding Market Disruption

If farmers don't have certainty in what they buy, they can not communicate to grain buyers or end users what technology is in their grain, making it difficult to ensure that products don't end up in markets where they're not approved.

This was the impetus for the formation of a Joint Post Patent Working Group, bringing together CropLife Canada and the Canadian Seed Trade Association, of which both Hadley and Armstrong are participants. The group is tasked with developing strategies to: Maintain export market access for Canadian seed derived products; maintain confidence in the regulatory system; support sustainable production practices for post patent traits; and develop a clear, unified message.

"With off patent technology, the grower may not receive the correct guidance, increasing the risk the technology may fail, which could also impact similar technologies."

—Darrel Armstrong

The working group has completed a white paper outlining the current state with roles and responsibilities, the challenges and risks associated with the current structure, and guiding principles for the development of a new framework. The working group is expected to continue its efforts and looks to engage Agriculture and Agri-Food Canada and the Canadian Food Inspection Agency in discussions this fall. **Julie Deering**

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New Breeding Techniques

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IT has been recited many times before, our planet is faced with some of the most fearsome challenges it has ever seen. We need to produce more food and more energy for an ever-growing population, and we need to do that on less land, with less water, less resources, and in a more sustainable manner. And all of that in a changing climate.

Over the past century, plant breeding has been a major contributor, improving plant varieties to cope with population growth. However, due to urbanization, agriculture has been pushed to ever more marginal lands, and yield increases have been plateauing in several crops. So plant breeders will need to step up their efforts. Continuing on the way they have done so far won't suffice in the coming decades. We need another revolution. And this revolution may very well come in the form of new breeding techniques (NBTs).

This group of techniques has been developed over the past 10 to 15 years, both in the public as well as in the private sector. The beauty of these techniques is they are capable of delivering a desired genetic trait(s) in a much more precise way than other techniques could, so far. Whereas in current plant breeding there are sometimes limitations in delivering the right characteristics to the target varieties, these techniques offer new possibilities to EU plant breeders.

It is a known fact that conventional plant breeding takes time. Surveys among plant breeding companies show it can take, on average, from seven to 12 (sometimes up to 20) years to generate a new plant variety with the desired characteristics, depending on the crop. Use of NBTs significantly shortens this period.

For example, in certain species it can be very time consuming to introduce a new resistance gene from the same, or related, species, due to the crop's complex genetics. The result is, not all crosses produce fertile offspring. In addition, the growth habit of the crop itself can prevent a quick introduction of the trait. For example, trees take several years until the first flowers and fruits develop, and it can take decades to create a new variety. In this article, we'll provide a technical overview of the different methods developed so far. A future issue of European Seed will address the regulatory environment surrounding NBTs.

Sequence-Specific Nuclease Technology

Sequence-specific nuclease (SSN) technology is often referred to as site-directed nuclease. It uses natural enzymes that generate a double-strand break in the DNA. These enzymes are linked to man-made structures designed to bind to a specific target DNA sequence. The complex causes a break at an exact pre-defined location in the DNA. The plant's own repair mechanism repairs the break, but often inaccurately. There are three application types of SSN, SSN-1, SSN-2 and SSN-3.

With the application type SSN-1, no donor-DNA is used to guide the repair. Non-homologous end-joining (NHEJ) takes place, resulting, in most instances, in small deletions in the DNA, however, sometimes small additions can take place. These small alterations lead to loss of gene function (a gene knock-out).

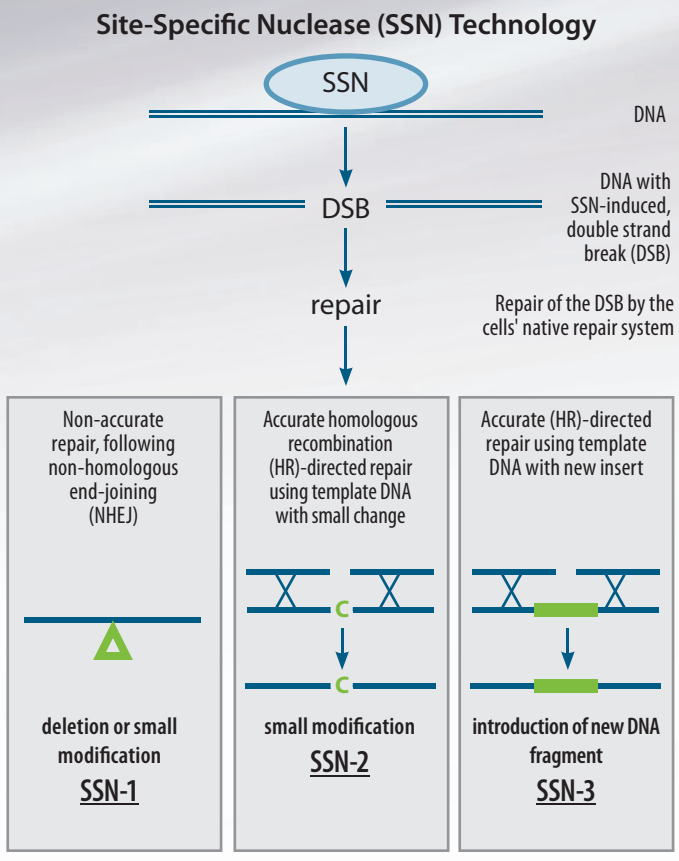

Figure 1. Outline of sequence-specific nuclease technologies SSN-1, SSN-2 and SSN-3.

The SSN-2 technique uses a donor DNA, which is a copy of the target DNA region with a small modification. During repair, the plant will use this template for the repair, and the small modification will be introduced into the plant's genome (targeted mutation).

The repair template of the SSN-3 application type contains a complete new gene. Using SSN-3, intragenes, cisgenes (see below) or transgenes can be introduced (gene addition).

In any of the three ways described above, with SSN, a gene of interest can be mutated, replaced or knocked out (Figure 1). CRISPR-Cas9, zinc-finger nucleases (ZFNs), TALENs and meganucleases are all different variants of SSN.

For decades, plant breeders have been using classical mutagenesis methods, such as chemicals or ionizing radiation. In a way, similar results can be obtained with SSN-1, SSN-2 and classical mutagenesis methods, with one big difference—classical mutagenesis leads to thousands of random mutations, whereas SSN-1 and SSN-2 lead to single specific mutations in a targeted gene.

Another disadvantage of classical mutagenesis methods is this necessitates a selection for plants with the intended mutations, but also plant breeders must carry out several generations of backcrossing to get rid of unwanted mutations. These two latter steps are much simpler and faster when using SSN-1 or SSN-2.

Oligonucleotide-Directed Mutagenesis

The technique oligonucleotide-directed mutagenesis (ODM) uses oligonucleotides (small molecules) into which, in a similar manner to SSN-2, a small repair template is introduced into the plant cell, which is identical to the plant's genetic material—except for the desired change.

After the DNA repair process, plants are selected where the modification has been copied into the DNA. The difference with SSN-2 is no genetic construct is copied into the DNA of the plant itself. The small repair molecule that is used remains briefly in the plant cell and is quickly degraded (Figure 2). This method only works in plants that can be regenerated from protoplasts.

It is important to mention that with SSN-1, SSN-2 and ODM, additional genetic variation is created within an existing species without crossing any species barrier. It is this creation of additional genetic variation that is absolutely crucial and fundamental to plant breeding.

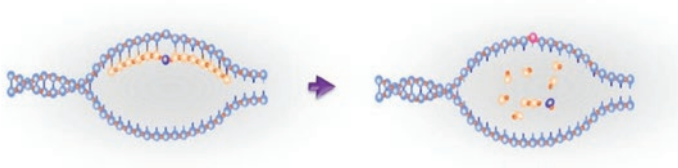

Figure 2. Simplified illustration of ODM. The left DNA helix (light blue/red) with oligonucleotide template (tan/red) containing one intended mismatch (dark blue). After the endogenous DNA repair mechanism has copied the change (pink) into the DNA, the template is degraded. The strands return to their original form (not shown) and the DNA repair mechanism copies the intended change of one strand into the complementary strand, successfully completing the process. Illustration courtesy of NBT Platform

RNA-Dependent DNA methylation

RNA-dependent DNA methylation (RdDM) relies on the plant's defence system (RNA-induced silencing complex, RISC), which is activated by small double-stranded RNA molecules (from viruses, for example). The system forms a complex with the RNA of foreign origin and methylates the matching DNA, ultimately blocking the expression of the gene (Figure 3).

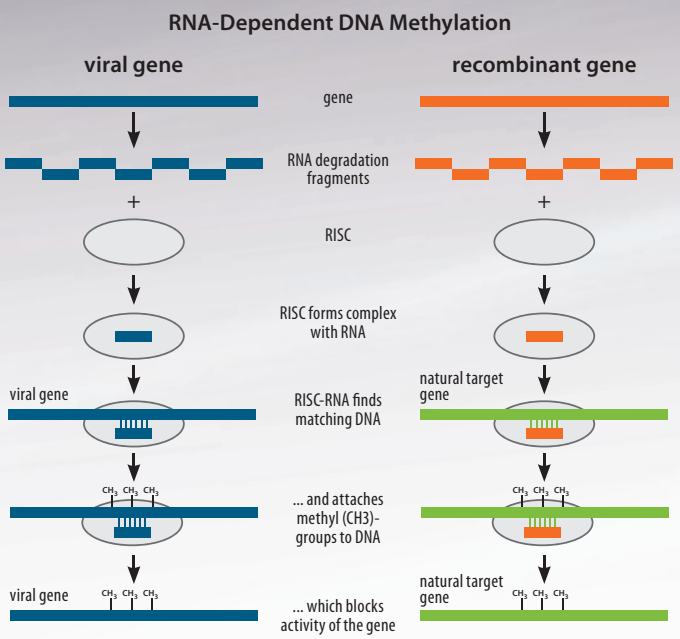

Figure 3. Simplified graphical representation of RdDM. On the left side, the plant's natural defence system leading to methylation of a viral gene. On the right side, recombinant-derived RNA molecules guide the RISC to its natural counterpart, resulting in DNA methylation and a subsequent blocking of gene activity. The recombinant gene contains fragments of the natural gene to be targeted Illustration courtesy of Wageningen UR

Reverse Breeding

It is not possible to exactly reproduce a heterozygous plant via seeds. Only vegetative reproduction will allow for an exact copy. However, seed companies are geared to reproduce and commercialise their elite plant varieties by means of seeds, as vegetative reproduction is often too expensive, technically cumbersome, and commercialization is often logistically impossible. Reverse breeding uses a genetic modification step to suppress the recombination of chromosomes, followed by specific tissue culture to create homozygous parent lines. These lines are then used to stably produce the heterozygous elite plants through seed (Figure 4).

GM Rootstock Grafting

With this technique, the top part of a plant, called the scion, is grafted onto a GM rootstock (Figure 5). The resulting combined

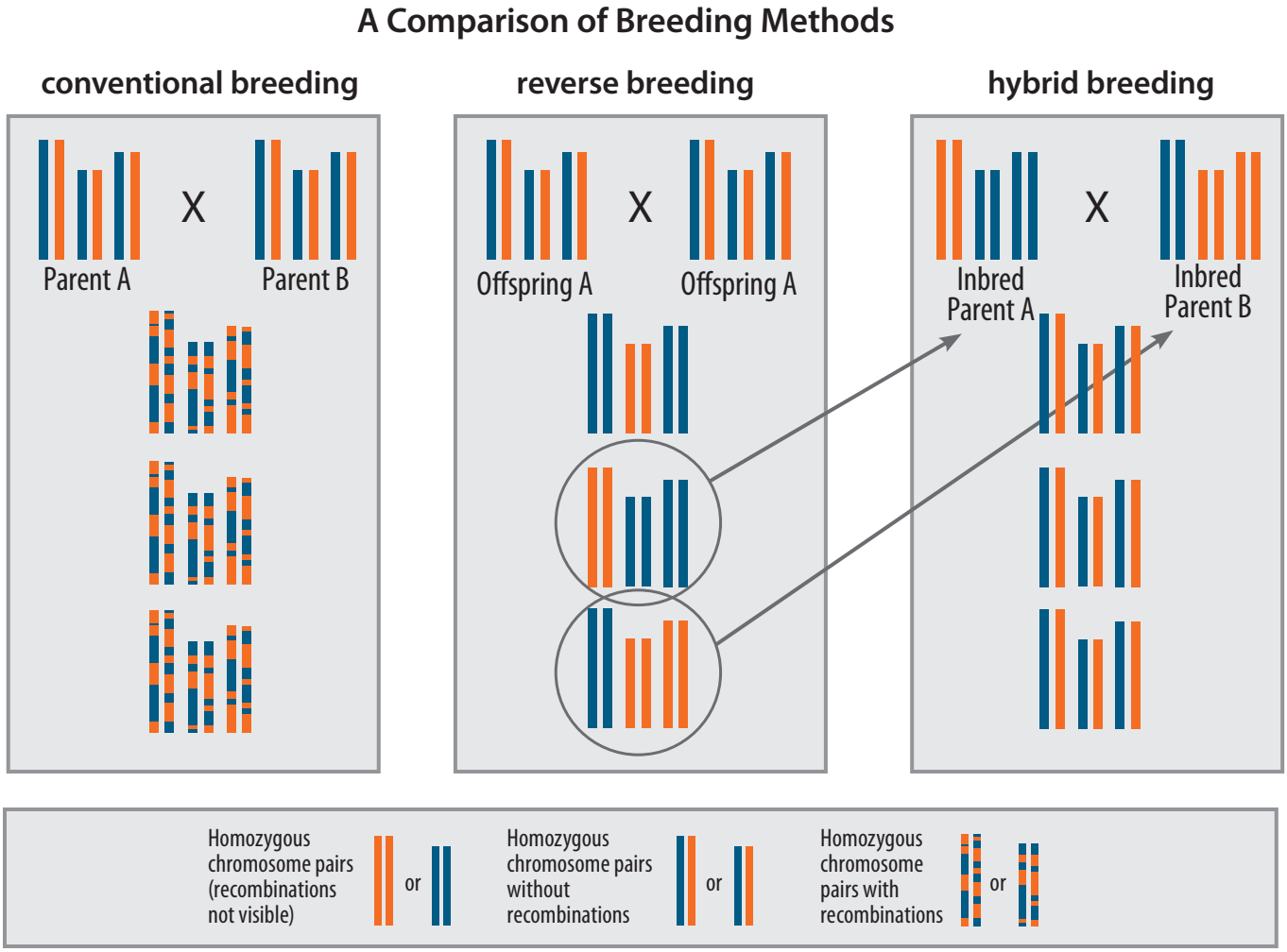

Figure 4. Schematic overview of the final outcomes of different breeding approaches. During conventional breeding, recombination of chromosome pairs results in the reshuffling of genetic material, and the unique combination of genetic variation will be lost. In reverse breeding, a selected heterozygous offspring plant is crossed with itself, while chromosomal recombination is suppressed by a transgene, resulting in lines with homozygous chromosome pairs. The haploidisation step (producing plants in which only one chromosome of each chromosome pair is present), and the subsequent doubling of the chromosomes (producing doubled-haploid plants with homozygous chromosome pairs), are not shown here. For hybrid variety production, parental lines in which the genetic variation of the chromosome pairs complement each other are selected from the reverse breeding program. Crossing such lines will result in uniform offspring hybrid plants (seeds), which are genetically similar to the plants with which the reverse breeding was started. Illustration courtesy of Wageningen UR

plant is usually regarded as a GM plant, but the products, such as the flowers or the fruits that are harvested on the non-GM scion, do not carry the genetic modification, and are considered GM-free. This is particularly useful in cases where the rootstock conveys beneficial characteristics to the combination, such as more efficient nutrient uptake from the soil, better rooting ability in heavy soils, or resistance to soil-borne diseases (e.g. nematodes).

Induced Early Flowering

With this approach, recombinant genes are introduced into a plant that promote flowering in the first year. This is particularly helpful in trees that have a long juvenile phase in which they don't flower. The early flowering enables much faster breeding and selection in these species. In the final breeding step, the recombinant early flowering genes are crossed out, resulting in varieties that are free of any transgenes. The plants produced in this way are indistinguishable from varieties obtained through conventional breeding, but are now achieved decades earlier.

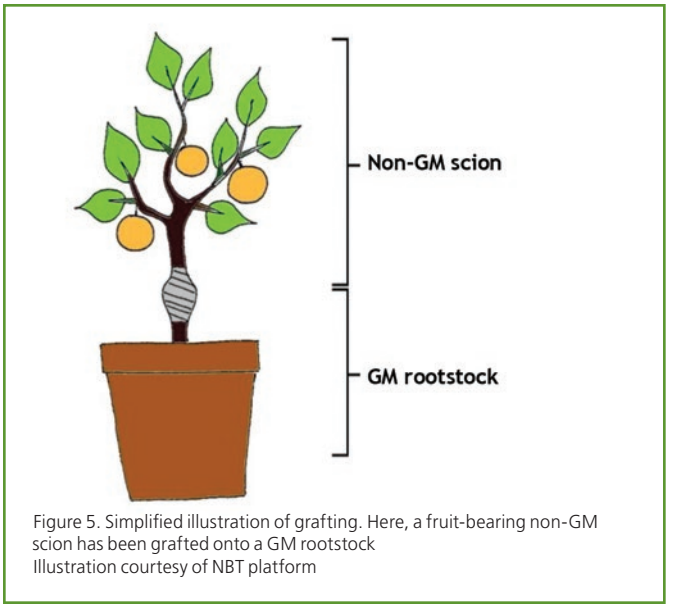

Figure 5. Simplified illustration of grafting. Here, a fruit-bearing non-GM scion has been grafted onto a GM rootstock
Illustration courtesy of NBT platform





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Where on the Web:

Position paper of European Seed Association (ESA) on New Plant Breeding Techniques: https://www.euroseeds.eu/new-plant-breeding-techniques

EU Commission page on New Plant Breeding Techniques:

http://ec.europa.eu/food/plant/gmo/legislation/plant_breeding/index_en.htm

EFSA paper on cisgenesis & intragenesis: http://www.efsa.europa.eu/en/efsajournal/pub/2561

EFSA paper on Zinc Finger Nuclease 3: http://www.efsa.europa.eu/en/efsajournal/pub/2943

JRC paper on New Plant Breeding Techniques: http://ftp.jrc.es/EURdoc/JRC63971.pdf

New Breeding Techniques (NBT) Platform: www.nbtplatform.org

WUR brochure on Opportunities of New Plant Breeding Techniques: http://edepot.wur.nl/357723

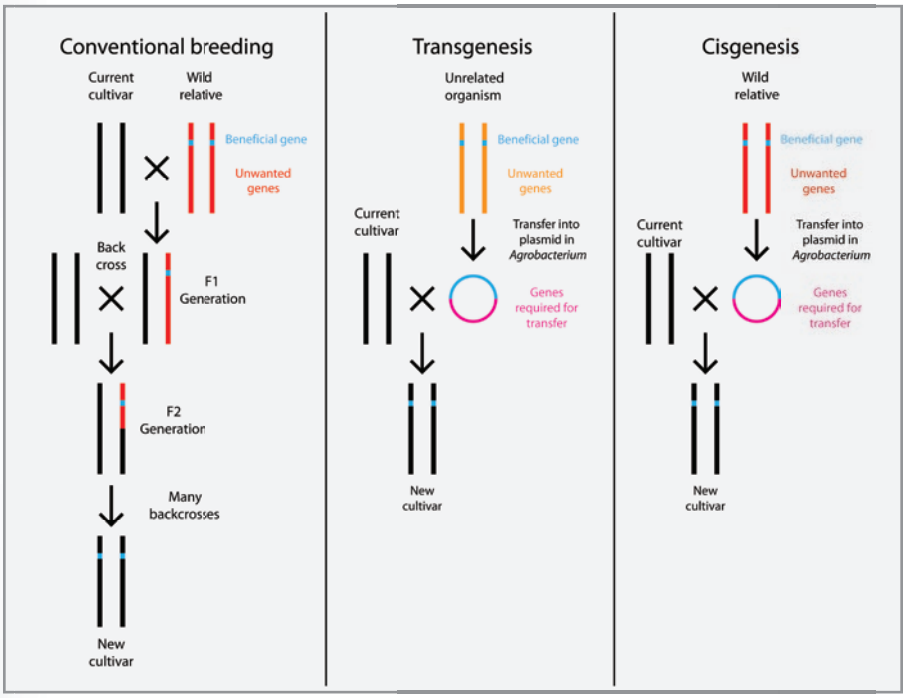

Figure 6. Diagram comparing the genetic changes achieved through conventional plant breeding, transgenesis and cisgenesis
Source: Wikipedia

Cisgenesis

Using this method, specific traits of interest are introduced into a plant using genetic modification, but only using genes from the same species, or from a species that can be crossed with it (Figure 6). The introduced cisgene is an identical copy of a gene from the sexually compatible pool, including promoter, introns and terminator. The donor plant must be crossable with the recipient plant. This means that the same result could be achieved through conventional plant breeding, but this would take a much longer period, often up to four or five times longer. This technique is especially promising for the development of plant varieties of vegetatively propagated crops, such as potato, apple, banana, cassava and grape.

Intragenesis

Plants created with this technique contain new genes that originate from the species itself or from a crossable species. Intragenesis allows in vitro recombination of genetic elements isolated from different genes within the sexually compatible gene pool. With cisgenesis, genes are a new combination of genetic elements that cannot be obtained with traditional breeding. For example, one can replace the natural promotor by a promotor from another gene that comes from the same species.

As with every technique there are limitations. One of the limitations shared by both cisgenesis and intragenesis is traits outside the sexually compatible gene pool cannot be introduced. Additionally, the creation of intragenic crops requires new expertise and more time compared with transgenic crops. The desired genes or fragments of genes may not be readily available, but have to be isolated from the sexually compatible gene pool.

Also, the production of selection marker-free plants often requires the implementation or development of new methods, since such methods may not be readily available

for the crop. This means considerable efforts have to be spent, especially on crops with low transformation efficiencies, to produce high numbers of modified plants.

The disadvantages described above for intragenesis and cisgenesis are greatly compensated by their potential to overcome some of the limitations of conventional plant breeding. Both cisgenesis and intragenesis confer a faster and more precise tool for the transfer of genetic constructs between related species than classical backcross breeding. At the same time, the linkage drag often seen in conventional backcross programs is avoided.

One of the limitations shared by both cisgenesis and intragenesis is traits outside the sexually compatible gene pool cannot be introduced.

The intra-/cisgenic techniques can also overcome limitations of classical breeding when it comes to improving traits with limited natural allelic variation. A higher expression level of a trait can be obtained through cisgenesis by inserting an additional gene copy of the trait, or through intragenesis by introducing a hybrid gene containing an advantageous promoter and terminator isolated from the sexually compatible gene pool. Lower expression levels can be obtained through intragenesis by the introduction of different silencing constructs.

Valuable New Tools

New plant breeding techniques significantly reduce the time and effort needed to produce new plant varieties, and allow more precision. It would seem that considering the immense challenges ahead, the NBTs provide valuable new tools to EU plant breeders that are much needed in light of both the EU's agricultural sector constraints and the global challenges concerning population increase, climate change, food security, and the sustainable use of resources. **Marcel Bruins**

Potential Applications of NBTs

- Potatoes with reduced amylase content and with late blight resistance.
- Apples with scab resistance and with decreased allergenicity.
- Rice with bacterial leaf blight resistance.
- Oilseed rape with herbicide tolerance.
- Wheat with powdery mildew resistance.
- Maize with drought tolerance and herbicide tolerance.
- Soybean with improved oil quality.

Advantages of NBTs:

- Increased precision and efficiency of the plant breeding process.
- Arrive quicker at the desired plant characteristics.
- Faster ways to increase plants' resistance to pests and diseases. This, in turn, leads to a reduction in the use of pesticides.
- Faster ways to increase plants' tolerance to abiotic stresses, such as drought, leading to better use of water and other resources. With that, new plant varieties provide for a greater harvest security and higher food security.
- Overall, NBTs provide benefits to EU consumers, and have a positive impact on the environment. Food is produced in a more sustainable manner.
- More high-quality plant varieties are available for EU farmers, giving them the possibility to produce food and feed in a more efficient and sustainable way. It also provides farmers with the necessary means to generate some much-needed economic benefits.
- The techniques will become a major driver of Europe's economy and ensure that EU plant breeders remain competitive on a global scale.

Alberta and British Columbia Pedigreed Seed Growers
Directory of Varieties Produced in 2016

Grower listings were prepared by the Canadian Seed Growers' Association for varieties eligible for sale in Canada and crops issued certificates at the time of publication. Breeding institution and distributor listings were prepared by the publisher. CSGA assumes no responsibility for errors or omissions in any listings. Pedigreed class code is listed after the grower's phone number.
S=Select; F=Foundation; R=Registered; C=Certified; BI=Breeding Institution; Dist=Canadian Distributor(s)
NOTE: Varieties denoted with a * are carryover pedigreed seed.

BARLEY

	S	F	R	C
AAC Connect (M)				
BI: AAFC, Dist: Canterra Seeds				
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322	S	F		
AAC SYNERGY				
BI: AAFC (Brandon), Dist: SeCan Members				
Eliason, Bruce W. / Wrentham / AB / (403) 222-2258				C
Ellis, Brian / Olds / AB / (403) 556-2890				C
Fairview Seed Cleaning Coop / Fairview / AB / (780) 835-2478				C
Gatez, Blaine Gerald / Crossfield / AB / (403) 946-3994				C
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268				C
Holtman, Scott / Taber / AB / (403) 381-1960				C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434				C
AC METCALFE				
BI: AAFC (Brandon), Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Cornish, Bob / Airdrie / AB / (403) 948-3070				C
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456				C
Dueck, Ralph E. & Brent / Olds / AB / (403) 556-2602	S	F		C
Eliason, Bruce W. / Wrentham / AB / (403) 222-2258				C
Foster'S Seed & Feed Limited / Beaverlodge / AB / (780) 354-2107				C
Hadland, Arthur Austin / Baldonnel / BC / (250) 789-3566				C
Kapitski, Lawrence / Andrew / AB / (780) 365-2134				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R*	
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500	S			C
Limoges, Richard / McLennan / AB / (780) 324-2335				C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C*
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595				C
Murray, Bruce & Wesley / Lethbridge / AB / (403) 327-9389				C
Niemela, Terrance & Tracy / Sylvan Lake / AB / (403) 746-2645				C
Ohrn, Norman / Thorsby / AB / (780) 985-2263				C
Penwest Seeds / Three Hills / AB / (403) 443-2577				C
Stamp Seeds / Enchant / AB / (403) 739-2233				C
Strain, Arthur George / Foremost / AB / (403) 867-2227				C
Svanes, Ronald J. / Picture Butte / AB / (403) 317-0981				C
Svean, Alan Carl & Scott / Rivercourse / AB / (780) 745-2578				C
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
Welsh, Stuart Jason / Milk River / AB / (403) 647-2228				C
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C
AC RANGER				
BI: AAFC (Brandon), Dist: FP Genetics				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372	S			
AMISK (M)				
BI: FCDC (Lacombe), Dist: SeCan Members				
Beamish, Dale / Jarvie / AB / (780) 954-2166				C
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900			R	
Haney Farms / Picture Butte / AB / (403) 738-4517				C
Jones, Greg Thomas & Tristan / Ponoka / AB / (403) 783-6495			R	C
Kittle, James William & Andrew / Viking / AB / (780) 336-2583				C
Plante, Jacques / St. Paul / AB / (780) 645-4604			R	
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617	S	F	R*	C*
Webber, Curtis / Stony Plain / AB / (780) 963-6897			R	C
Wildeman, Russell / Clive / AB / (403) 470-8528				C
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
BENTLEY				
BI: FCDC (Lacombe), Dist: Canterra Seeds				
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330				C
Parkland Fertilizers / Wetaskiwin / AB / (780) 352-3359				C
Penwest Seeds / Three Hills / AB / (403) 443-2577				C
Rasmussen, Brian/R4 Farms Ltd. / Standard / AB / (403) 644-3800				C
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*	F*	R	
BUSBY				
BI: FCDC (Lacombe), Dist: Mastin Seeds				
Anderson, Ken & Evelyn / Barrhead / AB / (780) 674-5670				C
CANMORE (M)				
BI: FCDC (Lacombe), Dist: Canterra Seeds				
Anderson, Ken & Evelyn / Barrhead / AB / (780) 674-5670				C
Airth, Jock & Linda / Brooks / AB / (403) 362-4372	S		R	
Benci, Dennis / Carmangay / AB / (403) 643-2294				C
Haney Farms / Picture Butte / AB / (403) 738-4517				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R	C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240			R	
Parkland Fertilizers / Wetaskiwin / AB / (780) 352-3359				C
Penwest Seeds / Three Hills / AB / (403) 443-2577				C
Rasmussen, Brian/R4 Farms Ltd. / Standard / AB / (403) 644-3800			R	C
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322			R	
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*	F*	R	C*
Welsh, Donald Alan / Milk River / AB / (403) 647-2228		F		
CDC AUSTENSON				
BI: CDC, Dist: SeCan Members				
Benci, Dennis / Carmangay / AB / (403) 643-2294				C
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515				C
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Dyck, Ernie / La Crete / AB / (780) 821-9445			R	
Dyck, Heinz & Colin & Alan & Kelton / Rosemary / AB / (403) 378-3321	S			C
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746				C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072				C
Hoff, Peter Edward / Gleichen / AB / (403) 734-2140	S			
Huvenaars, Carl / Hays / AB / (403) 725-2213			R	C
Jones, Greg Thomas & Tristan / Ponoka / AB / (403) 783-6495			R	
Kemp, Richard L. / Red Deer County / AB / (403) 227-4836				C
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409				C
Limoges, Richard / McLennan / AB / (780) 324-2335				C
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708				C
Massey, Derwin / Stettler / AB / (403) 883-2503				C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868				C
Meinczinger, Matthew Jr. / Busby / AB / (780) 349-2456			R	
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595		F	R	
Nemetz, Charlie & Jerritt & Lewis & Brandon / Stettler / AB / (403) 742-0436				C
Niemela, Terrance & Tracy / Sylvan Lake / AB / (403) 746-2645		F	R	C
Oatway's Seed Farm / Clive / AB / (403) 784-3001				C
Pare, Raymond A. / Wainwright / AB / (780) 842-2073	S		R	
Penwest Seeds / Three Hills / AB / (403) 443-2577				C
Selte, Donald / Vermilion / AB / (780) 853-2484				C
Shultz, Shawn / Didsbury / AB / (403) 335-3694				C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111				C
Smith, Gary W. / Eckville / AB / (403) 746-5878				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358			R*	
Stamp Seeds / Enchant / AB / (403) 739-2233				C
Stewart, E. Wilbur & Eldon / Big Valley / AB / (403) 876-2784				C
Templeton, Doran & Brant / Lethbridge / AB / (403) 345-4144				C
Trueblood, Brian G. / Dapp / AB / (780) 954-3745				C
Webber, Curtis / Stony Plain / AB / (780) 963-6897			R	C
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476			R	
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928			R	
CDC BATTLEFORD				
BI: CDC, Dist: SeCan Members				
Wagner, Terry & Loree / Lacombe / AB / (403) 782-2107				C
CDC BOW (M)				
BI: CDC, Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900	S			
Eliason, Bruce W. / Wrentham / AB / (403) 222-2258			R	
Goldstrom, David / Red Deer County / AB / (403) 227-2133			R	
Hadway, W. Tom & Carol / Didsbury / AB / (403) 335-4929		F		
Knight, William & Craig & Brian / Tees / AB / (403) 784-3633	S		R	
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409	S		R	
Shultz, Shawn / Didsbury / AB / (403) 335-3694	S			
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111		F		

Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F		
Stamp Seeds / Enchant / AB / (403) 739-2233			R	
Thompson, Ellwood & Kelly / Red Deer County / AB / (403) 728-3535			R	
Wagner, Terry & Loree / Lacombe / AB / (403) 782-2107		F	R	
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476			R	
CDC COALITION				
BI: CDC, Dist: SeCan Members				
Cyre, Clifford & Greg / Barrhead / AB / (780) 349-4775			R	C
Haney Farms / Picture Butte / AB / (403) 738-4517			R	
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C
Plante, Jacques / St. Paul / AB / (780) 645-4604				C
CDC COPELAND				
BI: CDC, Dist: SeCan Members				
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515			R	
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Clark, Todd / Edmonton / AB / (780) 499-5060				C
Dechaine, Louis / St. Lina / AB / (780) 635-2235				C
Dueck, Ralph E. & Brent / Olds / AB / (403) 556-2602	S	F	R	
Dyck, Ernie / La Crete / AB / (780) 821-9445			R	
Eliason, Bruce W. / Wrentham / AB / (403) 222-2258			R	C
Ellis, Brian / Olds / AB / (403) 556-2890				C
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036				C
Geeraert, Gerald / Rockyford / AB / (403) 533-2421				C
Goldstrom, David / Red Deer County / AB / (403) 227-2133			R	C
Hadway, W. Tom & Carol / Didsbury / AB / (403) 335-4929				C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072			R	
Hartzler, Leonard / Carstairs / AB / (403) 337-2416			R	C
Jensen, Albert / Drumheller / AB / (403) 823-9976				C
Jensen, Colin / Drumheller / AB / (403) 820-0181				C
Kemp, Richard L. / Red Deer County / AB / (403) 227-4836				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R	C
Kittle, James William & Andrew / Viking / AB / (780) 336-2583			R	
Knight, William & Craig & Brian / Tees / AB / (403) 784-3633			R	
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409			R	C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240			R	C
Macyk, Tim / Radway / AB / (780) 699-4073			R	
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708			R	C
Massey, Derwin / Stettler / AB / (403) 883-2503				C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868			R	
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595				C
Murray, Bruce & Wesley / Lethbridge / AB / (403) 327-9389				C
Niemela, Terrance & Tracy / Sylvan Lake / AB / (403) 746-2645	S	F		C
Nisbet, Andrew E. & Diane E. / Bowden / AB / (403) 224-3788	S		R	
Oatway's Seed Farm / Clive / AB / (403) 784-3001				C
Parkland Fertilizers / Wetaskiwin / AB / (780) 352-3359				C
Pedrozo, Alejandro / Airdrie / AB / (403) 948-6700				C
Penwest Seeds / Three Hills / AB / (403) 443-2577			R	C
Richards, Cliff & Dan / Sexsmith / AB / (780) 766-2266			R	C
Sayer, Roger / Carstairs / AB / (403) 337-5847				C
Schmermund, Donnie / Sturgeon County / AB / (780) 967-2850				C
Selte, Donald / Vermilion / AB / (780) 853-2484				C
Shultz, Shawn / Didsbury / AB / (403) 335-3694				C
Sich, Louis John & Ivan & Martin / Trochu / AB / (403) 442-2112			R	C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358			R	C
Stickland, Brian & Melvin G. & Irma / Red Deer / AB / (403) 886-4875				C
Svean, Alan Carl & Scott / Rivercourse / AB / (780) 745-2578			R	C
Victoor, Jesse / Sturgeon County / AB / (780) 459-3253				C
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253	S		R	C
Wagner, Terry & Loree / Lacombe / AB / (403) 782-2107			R	
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476			R	C
CDC COWBOY				
BI: CDC, Dist: SeCan Members				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372				C
Selte, Donald / Vermilion / AB / (780) 853-2484		F		C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617	S	F		
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
CDC FIBAR				
BI: CDC, Dist: Canterra Seeds				
Wheatcrest Farms / Lomond / AB / (403) 792-3696	S	F		
CDC FRASER				
BI: CDC, Dist: SeCan Members				
Niemela, Terrance & Tracy / Sylvan Lake / AB / (403) 746-2645	S	F		
CDC HILOSE				
BI: CDC, Dist: Canterra Seeds				
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322		F		
CDC KINDERSLEY				
BI: CDC, Dist: SeCan Members				
Niemela, Terrance & Tracy / Sylvan Lake / AB / (403) 746-2645			R	C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928				C

CDC MAVERICK				
BI: CDC, Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Dechaine, Louis / St. Lina / AB / (780) 635-2235				C
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383			R	
Hadland, Edward / Baldonnel / BC / (250) 793-9746				C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072				C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868			R	C
Metzger, Don / Carbon / AB / (403) 572-3284				C
Selte, Donald / Vermilion / AB / (780) 853-2484			R	
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F*		
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617			R	
Webber, Curtis / Stony Plain / AB / (780) 963-6897			R	
CDC MEREDITH				
BI: CDC, Dist: SeCan Members				
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456		F		C
Foster, Norman R. / Beaverlodge / AB / (780) 354-2107				C
Harris, William P. & Linda & Thomas & A. / Beaverlodge / AB / (780) 354-2823	S	F	R	
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C*
CDC THOMPSON				
BI: CDC, Dist: FP Genetics				
Thompson, M. Ellwood & Kelly / Red Deer County / AB / (403) 728-3535			R	
CDC TREY				
BI: CDC, Dist: FP Genetics				
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928			R	
CERVEZA				
BI: AAFC (Brandon), Dist: Mastin Seeds				
Mastin, Robert B. / Sundre / AB / (403) 556-2609	S		R	
CHIGWELL				
BI: FCDC (Lacombe), Dist: SeCan Members				
Anderson, Ken & Evelyn / Barrhead / AB / (780) 674-5670				C
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C
Repka, Gerald / Willingdon / AB / (780) 636-3458				C
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
GADSBY				
BI: FCDC (Lacombe), Dist: SeCan Members				
Harris, William P. & Linda & Thomas & A. / Beaverlodge / AB / (780) 354-2823	S	F		

Ohrn, Norman / Thorsby / AB / (780) 985-2263				C
Schmermund, Donnie / Sturgeon County / AB / (780) 967-2850				C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F*	R	C*
Webber, Curtis / Stony Plain / AB / (780) 963-6897			R	C
LEGACY				
BI: Busch Ag Res., Dist: CPS (Canada) Inc./FP Genetics				
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928		F		C
MAJOR				
BI: N/A, Dist: CPS (Canada) Inc.				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372	S			
MERIT 57				
BI: Busch Ag Res., Dist: CPS (Canada) Inc./FP Genetics				
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*			
NEWDALE				
BI: AAFC (Braondon), Dist: FP Genetics				
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330				C
PONOKA				
BI: FCDC (Lacombe), Dist: SeCan Members				
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
SEEBE				
BI: FCDC (Lacombe), Dist: SeCan Members				
Anderson, Ken & Evelyn / Barrhead / AB / (780) 674-5670				C
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
SUNDRE				
BI: FCDC (Lacombe), Dist: Mastin Seeds				
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C
Jones, Danny / Beaverlodge / AB / (780) 354-8089			R	
Mastin, Robert B. / Sundre / AB / (403) 556-2609				C
TROCHU				
BI: FCDC (Lacombe), Dist: SeCan Members				
Kittle, James William & Andrew / Viking / AB / (780) 336-2583				C
Webber, Curtis / Stony Plain / AB / (780) 963-6897			R	C
VIVAR				
BI: FCDC (Lacombe), Dist: SeCan Members				
Beamish, Dale / Jarvie / AB / (780) 954-2166				C
McDonald, Grant / Didsbury / AB / (403) 335-8188				C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111				C

OATS

	S	F	R	C
AC MORGAN				
BI: AAFC (Lacombe), Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Hill, Gordon P. & Blair / Taylor / BC / (250) 789-3469			R	C
Jonk, Nicholas / Westlock / AB / (780) 349-5458				C
Kemp, Richard L. / Red Deer County / AB / (403) 227-4836			R	
Massey, Derwin / Stettler / AB / (403) 883-2503				C
Meinczinger, Matthew Jr. / Busby / AB / (780) 349-2456				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595				C
Nemetz, Charlie & Jerritt & Lewis & Brandon / Stettler / AB / (403) 742-0436				C
Ohrn, Norman / Thorsby / AB / (780) 985-2263				C
Richard, Gerald / Spirit River / AB / (780) 864-2339			R	C
Selte, Donald / Vermilion / AB / (780) 853-2484			R	
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C*
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253			R	C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617	S*	F	R*	C
AC MUSTANG				
BI: AAFC (Lacombe), Dist: Mastin Seeds				
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746			R	C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330				C*
Mastin, Robert B. / Sundre / AB / (403) 556-2609				C
Richard, Gerald / Spirit River / AB / (780) 864-2339				C
CDC BALER				
BI: CDC, Dist: FP Genetics				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372				C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111				C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928		F	R	C
CDC HAYMAKER				
BI: N/A, Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383			R	
Hadway, Walter Thomas / Didsbury / AB / (403) 335-4929				C
Hoffmann, Curtis / Oyen / AB / (403) 664-9617				C
Jonk, Nicholas / Westlock / AB / (780) 349-5458				C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868			R	
Selte, Donald / Vermilion / AB / (780) 853-2484			R	C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617	S	F	R*	C*
CDC NASSER				
BI: CDC, Dist: N/A				
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456				C
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268				C
Repka, Gerald / Willingdon / AB / (780) 636-3458				C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251				C
CDC RUFFIAN				
BI: CDC, Dist: FP Genetics				
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036				C
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C
CDC SEABISCUIT				
BI: CDC, Dist: Canterra Seeds				
Jonk, Nicholas / Westlock / AB / (780) 349-5458			R*	
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322			R	
CS CAMDEN				
BI: Lantmannen SW Seed AB, Dist: Canterra Seeds				
Jonk, Nicholas / Westlock / AB / (780) 349-5458				C
Kapitski, Lawrence / Andrew / AB / (780) 365-2134				C
Sekulic, Nick / Rycroft / AB / (780) 814-2849				C
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322	S			
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253				C
Wuthrich, David / Cecil Lake / BC / (250) 781-3527	S	F		
FOOTHILL				
BI: N/A, Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383			R	
MURPHY				
BI: AAFC, Dist: SeCan Members				
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F*	R*	C*
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
STRIDE				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Jones, Greg Thomas & Tristan / Ponoka / AB / (403) 783-6495			R	
WALDERN				
BI: N/A, Dist: SeCan Members				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372			R	
Selte, Donald / Vermilion / AB / (780) 853-2484				C

RYE

	S	F	R	C
BONO				
BI: KWS, Dist: FP Genetics				
McNaughton, Brian / Lethbridge / AB / (403) 308-9914				C
BRASETTO				
BI: KWS, Dist: FP Genetics				
McNaughton, Brian / Lethbridge / AB / (403) 308-9914				C
GUTTINO				
BI: KWS, Dist: SeedNet				
Benci, Dennis / Carmangay / AB / (403) 643-2294				C
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
Stamp Seeds / Enchant / AB / (403) 739-2233				C
HAZLET				
BI: AAFC (Swift Current), Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383			R	
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476			R	C
MUSKETEER				
BI: AAFC (Swift Current), Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383		F	R	
PRIMA				
BI: AAFC (Swift Current), Dist: SeCan Members				
Mueller, Darcy / Three Hills / AB / (403) 820-4115	S			
Page, Dan / Didsbury / AB / (403) 335-4563			R	
Weigum, Sarah / Three Hills / AB / (403) 443-9599			R	C

TRITICALE - SPRING

	S	F	R	C
AC ULTIMA				
BI: AAFC, Dist: FP Genetics				
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*	F*	R*	
BREVIS				
BI: AAFC, Dist: N/A				
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111			R	
Webber, Curtis / Stony Plain / AB / (780) 963-6897				C
BUNKER				
BI: FCDC (Lacombe), Dist: FP Genetics				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F*	R	
PRONGHORN				
BI: AAFC, Dist: N/A				
Mans, John / Nobleford / AB / (403) 824-3585				C
SUNRAY				
BI: AAFC, Dist: N/A				
Benci, Dennis / Carmangay / AB / (403) 643-2294			R*	C
Fabian, Patrick V. / Tilley / AB / (403) 377-2000				C
Jonk, Nicholas / Westlock / AB / (780) 349-5458			R	
TAZA				
BI: FCDC (Lacombe), Dist: Solick Seeds				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F*	R	C
TYNDAL				
BI: FCDC (Lacombe), Dist: SeCan Members				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C

TRITICALE - WINTER

	S	F	R	C
BOBCAT				
BI: FCDC (Lacombe), Dist: N/A				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464			R	C*
Fabian, Patrick V. / Tilley / AB / (403) 377-2000			R	
LUOMA				
BI: FCDC (Lacombe), Dist: N/A				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464	S			C
METZGER				
BI: FCDC (Lacombe), Dist: Haney Farms Ltd				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358			R	
PIKA				
BI: FCDC (Lacombe), Dist: N/A				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372	S	F		

WHEAT

	S	F	R	C
5700PR				
BI: N/A, Dist: CPS (Canada) Inc.				
Laird, Patrick R. / Paradise Valley / AB / (780) 745-2379			R	
AAC BRANDON				
BI: AAFC (Swift Current), Dist: SeCan Members				
Baier, Bill & Dean / Clyde / AB / (780) 348-5791				C
Benci, Dennis / Carmangay / AB / (403) 643-2294			R*	C
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515				C
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Clark, Todd / Edmonton / AB / (780) 499-5060				C
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264				C
Cyre, Clifford & Greg / Barrhead / AB / (780) 349-4775				C
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456			R	
Dovichak, Michael / Brooks / AB / (403) 501-5420				C
Dyck, Heinz W. & Colin & Alan & Kelton / Rosemary / AB / (403) 378-3321	S		R	
Ellis, Brian / Olds / AB / (403) 556-2890				C
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036			R	C
Hoffmann, Curtis / Oyen / AB / (403) 664-9617			R	C
Huvenaars, Carl / Hays / AB / (403) 725-2213				C
Huvenaars, John & Lisa / Hays / AB / (403) 725-2126				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R*	C
Kittle, James William & Andrew / Viking / AB / (780) 336-2583			R	C
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409				C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C
Lopushinsky, Julian / Bruderheim / AB / (780) 796-2048			R	
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708			R	
Massey, Derwin / Stettler / AB / (403) 883-2503				C
Metzger, Don / Carbon / AB / (403) 572-3284				C
Miller, Brian / Barrhead / AB / (780) 674-5001				C
Mueller, Darcy / Three Hills / AB / (403) 820-4115	S			
Nemetz, Charlie & Jerritt & Lewis & Brandon / Stettler / AB / (403) 742-0436				C
Pare, Raymond A. / Wainwright / AB / (780) 842-2073	S	F	R	
Parkland Fertilizers / Wetaskiwin / AB / (780) 352-3359				C
Penwest Seeds / Three Hills / AB / (403) 443-2577				C
Sekulic, Nick / Rycroft / AB / (780) 814-2849				C
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322				C
Shultz, Shawn / Didsbury / AB / (403) 335-3694				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*	F	R	C
Stamp Seeds / Enchant / AB / (403) 739-2233				C
Stewart, E. Wilbur & Eldon / Big Valley / AB / (403) 876-2784			R	C
Thompson, M. Ellwood & Kelly / Red Deer County / AB / (403) 728-3535				C
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018				C
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253			R	
Wagner, Terry & Loree / Lacombe / AB / (403) 782-2107			R	C
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
AAC CHIFFON				
BI: AAFC (Lethbridge), Dist: SeedNet Inc.				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383				C
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708			R	
Stamp Seeds / Enchant / AB / (403) 739-2233	S		R*	C
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
AAC CONCORD				
BI: AAFC, Dist: Canterra Seeds				
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F		
AAC CONNERY				
BI: AAFC, Dist: Canterra Seeds				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372			R	
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036			R	
Haney Farms / Picture Butte / AB / (403) 738-4517			R	
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268				C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240	S		R	
Parkland Fertilizers / Wetaskiwin / AB / (780) 352-3359			R	
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253	S			
Welsh, Donald Alan / Milk River / AB / (403) 647-2228	S			
AAC CROSSFIELD				
BI: AAFC, Dist: Canterra Seeds				
Rasmussen, Brian/R4 Farms Ltd. / Standard / AB / (403) 644-3800	S			
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322	S			
AAC ELIE				
BI: AAFC (Swift Current), Dist: Alliance Seed				
Hierath, Michael Wayne & Philip / Milk River / AB / (403) 647-2347				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R*	C
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736			R	C
Sich, Louis John & Ivan & Martin / Trochu / AB / (403) 442-2112				C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111				C

Stamp Seeds / Enchant / AB / (403) 739-2233	S	F	R	C*
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018				C
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C
AAC INDUS (H)				
BI: AAFC, Dist: N/A				
Kittle, James William & Andrew / Viking / AB / (780) 336-2583		F		
Stamp Seeds / Enchant / AB / (403) 739-2233			R	
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S			
AAC PENHOLD (H)				
BI: AAFC (Swift Current), Dist: SeCan Members				
Anderson, Ken & Evelyn / Barrhead / AB / (780) 674-5670				C
Baier, Bill & Dean / Clyde / AB / (780) 348-5791			R	
Beamish, Dale / Jarvie / AB / (780) 954-2166				C
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900			R	
Clark, Todd / Edmonton / AB / (780) 499-5060			R	C
Cyre, Clifford & Greg / Barrhead / AB / (780) 349-4775			R	C
Dargis, Richard / St. Vincent / AB / (780) 635-2333			R	
Dewindt, Harry & Renee / Thorhild / AB / (780) 398-2377				C
Diachyshyn, Mike / Waskatenau / AB / (780) 691-7104				C
Ellis, Brian / Olds / AB / (403) 556-2890				C
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036	S	F	R	
Goldstrom, David / Red Deer County / AB / (403) 227-2133				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746				C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072			R	C
Haney Farms / Picture Butte / AB / (403) 738-4517				C
Huvenaars, Carl / Hays / AB / (403) 725-2213			R	C
Jackson, Thomas / Killam / AB / (780) 385-2332			R	C
Jones, Greg Thomas & Tristan / Ponoka / AB / (403) 783-6495		F		
Kemp, Richard L. / Red Deer County / AB / (403) 227-4836			R	C
Lawrence, Cody / Wainwright / AB / (780) 842-0285				C
Limoges, Richard / McLennan / AB / (780) 324-2335			R	
Lindholm Seed Farm / New Norway / AB / (780) 352-3240	S	F	R	C
Lopushinsky, Julian / Bruderheim / AB / (780) 796-2048			R	
Macyk, Tim / Radway / AB / (780) 699-4073			R	C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868				C
Miller, Brian / Barrhead / AB / (780) 674-5001				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595	S	F	R	
Forward Seed Farm / County Of Barrhead / AB / (780) 674-3822			R	C
Nisbet, Andrew E. & Diane E. / Bowden / AB / (403) 224-3788		F	R	
Oatway's Seed Farm / Clive / AB / (403) 784-3001	S		R	C
Pare, Raymond A. / Wainwright / AB / (780) 842-2073	S	F	R	
Plante, Jacques / St. Paul / AB / (780) 645-4604				C
Radke, Bryan Victor / Barrhead / AB / (780) 674-5715		F	R	C
Sayer, Roger / Carstairs / AB / (403) 337-5847			R	C
Schmermund, Donnie / Sturgeon County / AB / (780) 967-2850			R	
Sekulic, Nick / Rycroft / AB / (780) 814-2849				C
Sendziak, Don P & Stephen / Edmonton / AB / (780) 434-1322		F		C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111			R	
Smith, Gary W. / Eckville / AB / (403) 746-5878			R	
Stamp Seeds / Enchant / AB / (403) 739-2233				C
Stickland, Brian & Melvin G. & Irma / Red Deer / AB / (403) 886-4875			R	C
Thompson, M. Ellwood & Kelly / Red Deer County / AB / (403) 728-3535	S	F		C
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C
Trueblood, Brian G. / Dapp / AB / (780) 954-3745				C
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253	S		R	C
Wierenga, Brad, Bruce & Clayton / County Of Barrhead / AB / (780) 674-4624				C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928	S	F		C
AAC REDBERRY				
BI: AAFC, Dist: N/A				
Stamp Seeds / Enchant / AB / (403) 739-2233		F		C
AAC REDWATER (H)				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Dechaine, Louis / St. Lina / AB / (780) 635-2235			R	
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036	S	F	R	C
Goldstrom, David / Red Deer County / AB / (403) 227-2133				C
Hadway, W. Tom & Carol / Didsbury / AB / (403) 335-4929			R	C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072				C
Hegland, David Olaf / Wembley / AB / (780) 766-2450				C
Huvenaars, Carl / Hays / AB / (403) 725-2213				C
Lopushinsky, Julian / Bruderheim / AB / (780) 796-2048				C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868				C
Oatway's Seed Farm / Clive / AB / (403) 784-3001			R	
Sayer, Roger / Carstairs / AB / (403) 337-5847				C
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322			R	
Stamp Seeds / Enchant / AB / (403) 739-2233			R	C*
Trueblood, Brian G. / Dapp / AB / (780) 954-3745		F		C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F	R	C*

Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476				C
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
AAC RYLEY				
BI: AAFC (Swift Current), Dist: SeCan Members				
Hadway, W. Tom & Carol / Didsbury / AB / (403) 335-4929				C
Metzger, Don / Carbon / AB / (403) 572-3284				C
Ohrn, Norman / Thorsby / AB / (780) 985-2263			R	
Wuthrich, David / Cecil Lake / BC / (250) 781-3527	S			
AAC VIEWFIELD				
BI: AAFC, Dist: N/A				
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251		F		
AC ANDREW				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456				C
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383			R	
Kittle, James William & Andrew / Viking / AB / (780) 336-2583				C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251			R	C
AC FOREMOST				
BI: AAFC (Swift Current), Dist: SeCan Members				
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253				C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928				C
AC LILLIAN				
BI: AAFC, Dist: SeCan Members				
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264				C*
CARBERRY				
BI: AAFC (Swift Current), Dist: SeCan Members				
Cailliau, John & Dana & S. & Dave & D. / Enchant / AB / (403) 739-3100				C
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264				C
Jonk, Nicholas / Westlock / AB / (780) 349-5458			R*	C*
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409			R	C
Pepneck, David / Vauxhall / AB / (403) 424-0096				C
Schmermund, Donnie / Sturgeon County / AB / (780) 967-2850			R	
Stamp Seeds / Enchant / AB / (403) 739-2233				C
Strain, Arthur George / Foremost / AB / (403) 867-2227			R	C
CARDALE				
BI: AAFC (Winnipeg), Dist: Seed Depot				
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264				C
Stamp Seeds / Enchant / AB / (403) 739-2233				C

CDC BRADWELL				
BI: CDC, Dist: SeCan Members				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736	S	F		
CDC GO				
BI: CDC, Dist: Mastin Seeds				
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264			R	
Kemp, Richard L. / Red Deer County / AB / (403) 227-4836			R	
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330				C
Limoges, Richard / McLennan / AB / (780) 324-2335			R	C
Murray, Bruce & Wesley / Lethbridge / AB / (403) 327-9389			R	
Penwest Seeds / Three Hills / AB / (403) 443-2577				C
Pepneck, David / Vauxhall / AB / (403) 424-0096				C
Schmermund, Donnie / Sturgeon County / AB / (780) 967-2850			R	
Sich, Louis John & Ivan & Martin / Trochu / AB / (403) 442-2112				C
Stamp Seeds / Enchant / AB / (403) 739-2233	S*	F	R	
Templeton, Doran & Brant / Lethbridge / AB / (403) 345-4144			R	
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476				C
CDC OSLER				
BI: CDC, Dist: N/A				
Hill, Gordon P. & Blair / Taylor / BC / (250) 789-3469				C
CDC PLENTIFUL				
BI: CDC, Dist: FP Genetics				
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036			R	
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268				C
Kapitski, Lawrence / Andrew / AB / (780) 365-2134				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330	S		R*	C*
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708			R	C
Massey, Derwin / Stettler / AB / (403) 883-2503				C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251			R	
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*	F*	R*	C
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253		F*		C
Welsh, Stuart Jason / Milk River / AB / (403) 647-2228			R	
CDC STANLEY				
BI: CDC, Dist: CPS (Canada) Inc.				
Laird, Patrick R. / Paradise Valley / AB / (780) 745-2379				C
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C

CDC UTMOST				
BI: CDC, Dist: N/A				
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F*	R*	C*
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C*
COLEMAN				
BI: U of Alberta, Dist: N/A				
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500				C
Richard, Gerald / Spirit River / AB / (780) 864-2339				C
CONQUER				
BI: AAFC, Dist: N/A				
Accu Seed / La Crete / AB / (780) 928-0096				C*
FALLER				
BI: NDSU Resarch Foundation, Dist: FP Genetics				
Stamp Seeds / Enchant / AB / (403) 739-2233				C
GO EARLY				
BI: U of Alberta, Dist: Mastin Seeds				
Mastin, Robert B. / Sundre / AB / (403) 556-2609			R	
Templeton, Doran & Brant / Lethbridge / AB / (403) 345-4144				C
HARVEST				
BI: AAFC (Winnipeg), Dist: FP Genetics				
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C*
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S*			
MUCHMORE				
BI: AAFC (Swift Current), Dist: FP Genetics				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372	S			
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036			R	C
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R	
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C
Lindholm, Luke & Stevan / New Norway / AB / (780) 608-4277				C
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708			R	C
Massey, Derwin / Stettler / AB / (403) 883-2503				C
Forward Seed Farm / County Of Barrhead / AB / (780) 674-3822				C
Nieboer, Nathan / Bow Island / AB / (403) 545-2222			R	
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251				C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358				C
Thompson, M. Ellwood & Kelly / Red Deer County / AB / (403) 728-3535				C
True Seeds Ltd. / Redwater / AB / (780) 777-5885			R*	C
Victoor, Rene & Jamie / Sturgeon County / AB / (780) 459-3253				C*
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C*
PARATA				
BI: N/A, Dist: N/A				
Macyk, Don / Waskatenau / AB / (780) 358-2411		F		
PARK				
BI: AAFC, Dist: N/A				
Lyster, Norman / Stettler / AB / (403) 742-4456	S			

PASTEUR				
BI: Wiersum Plant Breeding, Dist: SeCan Members				
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C*
Stamp Seeds / Enchant / AB / (403) 739-2233		F		C
Templeton, Doran & Brant / Lethbridge / AB / (403) 345-4144				C
SADASH				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Benci, Dennis / Carmangay / AB / (403) 643-2294				C
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C
Geeraert, Gerald / Rockyford / AB / (403) 533-2421				C
Haney Farms / Picture Butte / AB / (403) 738-4517				C
Hemminger, Patrick / Innisfail / AB / (403) 888-2050				C
Stamp Seeds / Enchant / AB / (403) 739-2233				C
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434				C
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928				C
STETTLER				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Benci, Dennis / Carmangay / AB / (403) 643-2294				C*
Clark, Todd / Edmonton / AB / (780) 499-5060				C
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456				C
Dyck, Ernie / La Crete / AB / (780) 821-9445			R	
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036			R	
Harris, William P. & Linda & Thomas & A. / Beaverlodge / AB / (780) 354-2823			R	
Kittle, James William & Andrew / Viking / AB / (780) 336-2583				C
Limoges, Richard / McLennan / AB / (780) 324-2335				C
Massey, Derwin / Stettler / AB / (403) 883-2503				C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868				C
Miller, Brian / Barrhead / AB / (780) 674-5001			R	
Mracek, Stan John / Dawson Creek / BC / (250) 843-7359				C
Nemetz, Charlie & Jerritt & Lewis & Brandon / Stettler / AB / (403) 742-0436				C
Pare, Raymond A. / Wainwright / AB / (780) 842-2073			R	
Trueblood, Brian G. / Dapp / AB / (780) 954-3745			R	
SUPERB				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Jones, Danny / Beaverlodge / AB / (780) 354-8089				C
SY433				
BI: Syngenta Seeds Canada, Dist: N/A				
Gatez, Blaine Gerald / Crossfield / AB / (403) 946-3994			R	
SY985				
BI: Syngenta Seeds Canada, Dist: Cargill Ltd, CPS (Canada) Inc and Andrukow Seed				
Stamp Seeds / Enchant / AB / (403) 739-2233		F		
THORSBY				
BI: U of Alberta, Dist: Canterra Seeds				
Berge, James Garnet / Dawson Creek / BC / (250) 759-4773				C
Richards, Cliff & Dan / Sexsmith / AB / (780) 766-2266			R	C
Wuthrich, David / Cecil Lake / BC / (250) 781-3527				C

WHEAT - DURUM

	S	F	R	C
AAC CABRI (p)				
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434		F		
AAC CONGRESS (p)				
BI: AAFC (Swift Current), Dist: Canterra Seeds				
Huvenaars, Carl / Hays / AB / (403) 725-2213		F		
Kiffiak, Nathan J. & Anderson, Tim / Foremost / AB / (403) 867-2338		F		
Welsh, Donald Alan / Milk River / AB / (403) 647-2228		F		
AAC CURRENT				
BI: AAFC (Swift Current), Dist: Alliance Seed				
Hierath, Michael Wayne & Philip / Milk River / AB / (403) 647-2347			R	C
AAC RAYMORE				
BI: AAFC (Swift Current), Dist: SeCan Members				
Huvenaars, Carl / Hays / AB / (403) 725-2213			R	
Stamp Seeds / Enchant / AB / (403) 739-2233			R	C*
Welsh, Stuart Jason / Milk River / AB / (403) 647-2228			R	
AAC SPITFIRE (p)				
BI: AAFC (Swift Current), Dist: SeCan Members				
Benci, Dennis / Carmangay / AB / (403) 643-2294			R	C
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900			R	
Hierath, Michael Wayne & Philip / Milk River / AB / (403) 647-2347				C
Kiffiak, Nathan J. & Anderson, Tim / Foremost / AB / (403) 867-2338				C
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
Stamp Seeds / Enchant / AB / (403) 739-2233		F	R*	C*
Welsh, Stuart Jason / Milk River / AB / (403) 647-2228		F		C
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S		R	C
AC NAVIGATOR				
BI: AAFC (Swift Current), Dist: N/A				
Wheatcrest Farms / Lomond / AB / (403) 792-3696	S	F		
CDC ALLOY (p)				
BI: CDC, Dist: CPS (Canada) Inc.				
Benci, Dennis / Carmangay / AB / (403) 643-2294	S			
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900	S	F		
Geldreich, Dave / Bow Island / AB / (403) 545-2222	S			
Welsh, Donald Alan / Milk River / AB / (403) 647-2228	S			
CDC DESIRE (p)				
BI: CDC, Dist: Syngenta Canada Inc.				
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434				C
CDC FORTITUDE (p)				
BI: CDC, Dist: CPS (Canada) Inc.				
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264			R	
CDC PRECISION (p)				
BI: CDC, Dist: Alliance Seed				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736	S	F		
Stamp Seeds / Enchant / AB / (403) 739-2233		F		
CDC VIVID (p)				
BI: CDC, Dist: CPS (Canada) Inc.				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
ENTERPRISE				
BI: AAFC (Swift Current), Dist: Canterra Seeds				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018				C
STRONGFIELD				
BI: AAFC (Swift Current), Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264			R	C
Nieboer, Nathan / Bow Island / AB / (403) 545-2222			R	C
TRANSCEND				
BI: AAFC (Swift Current), Dist: FP Genetics				
Benci, Dennis / Carmangay / AB / (403) 643-2294		F		C
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900			R	C
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708				C
Nieboer, Nathan / Bow Island / AB / (403) 545-2222				C
Strain, Arthur George / Foremost / AB / (403) 867-2227				C
Welsh, Donald Alan / Milk River / AB / (403) 647-2228				C
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C*

WHEAT - MIDGE TOLERANT

	S	F	R	C
AAC FORAY VB				
BI AAFC, Dist; SeCan Members				
Hoff, Peter Edward / Gleichen / AB / (403) 734-2140	S			
Holmstrom, Darrell & Barbara / Killam / AB / (780) 385-3574	S			
AAC TENACIOUS VB				
BI: AAFC, Dist: Alliance Seed				
Stamp Seeds / Enchant / AB / (403) 739-2233		F		C*
AC GOODEVE VB				
BI: AAFC, Dist: Alliance Seed				
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500	S			C
BW488 - CDC BRADWELL				
BI: N/A, Dist: N/A				
Geldreich, Dave / Bow Island / AB / (403) 545-2222*	S			
Welsh, Donald Alan / Milk River / AB / (403) 647-2228*	S			
CDC LANDMARK - AAC VIEWFIELD				
BI: N/A, Dist: N/A				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900*	S	F		
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708*	S	F		
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251*		F		
CDC TITANIUM VB				
BI: N/A, Dist: CPS (Canada) Inc.				
Laliberté, Adam & Vos, Henry / Fairview / AB / (780) 835-5286*			R	
CDC UTMOST - HARVEST				
BI: N/A, Dist: FP Genetics				
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708*				C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251*				C
CONQUER VB				
BI: AAFC (Winnipeg), Dist: Canterra Seeds				
Rasmussen, Brian/R4 Farms Ltd. / Standard / AB / (403) 644-3800		F*		
SHAW VB				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617			R*	C*

WHEAT - WINTER

	S	F	R	C
AAC ELEVATE (H)				
BI: AAFC, Dist: SeCan Members				
Hoffmann, Curtis / Oyen / AB / (403) 664-9617			R	
Stamp Seeds / Enchant / AB / (403) 739-2233	S	F		
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S	F		
AAC GATEWAY				
BI: AAFC, Dist: Seed Depot				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
Stamp Seeds / Enchant / AB / (403) 739-2233			R	C
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018				C
Welsh, Donald Alan / Milk River / AB / (403) 647-2228				C
AAC WILDFIRE (H)				
BI: AAFC, Dist: N/A				
Stamp Seeds / Enchant / AB / (403) 739-2233	S			
CDC CHASE				
BI: CDC, Dist: Canterra Seeds				
Strain, Arthur George / Foremost / AB / (403) 867-2227			R	
EMERSON				
BI: AAFC, Dist: Canterra Seeds				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C*
Haney Farms / Picture Butte / AB / (403) 738-4517				C
Wheatcrest Farms / Lomond / AB / (403) 792-3696				C*
MOATS				
BI: CDC, Dist: SeCan Members				
Benci, Dennis / Carmangay / AB / (403) 643-2294			R*	C*
Hoffmann, Curtis / Oyen / AB / (403) 664-9617				C
Limoges, Daniel / Girouxville / AB / (780) 833-1287			R	
Stamp Seeds / Enchant / AB / (403) 739-2233			R	C*
PINTAIL				
BI: FCDC (Lacombe), Dist: Mastin Seeds				
Mastin, Robert B. / Sundre / AB / (403) 556-2609				C
RADIANT				
BI: AAFC (Lethbridge), Dist: Canterra Seeds				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C*

CANOLA SEED DISTRIBUTORS

For additional canola varieties available for purchase and detailed variety information please contact these canola seed distributors.

BASF / 1-800-371- 2273 / www.agsolutions.ca
Bayer CropScience / 1-888-283-6847 / www.bayercropscience.ca
BrettYoung Seeds Ltd. / 1-800-665-5015 /www.brettyoung.ca
Canterra Seeds Ltd. / (204) 988-9750 / www.canterra.com
Cargill Specialty Seeds & Oils / 1-800-323-6232 / www.victorycanola.com
DEKALB Canada/Monsanto Canada Inc. / 1-800-667-4944 / www.DEKALB.ca
DL Seeds / (204) 331-2361 / www.dlseeds.ca
Dow AgroSciences / 1-800-667-3852 / www.dowagro.ca
DuPont Pioneer / (306) 385-3001 / www.pioneer.com/canada
Mastin Seeds / (403) 556-2609 / www.mastinseeds.com
Proven Seed/CPS (Canada) Inc. / (306) 480-8520 / provenseed.ca
SeCan / 800-665-7333 / www.secan.com
Syngenta Canada Inc. / 1-877-964-3682 / www.syngentafarm.ca

ADDITIONAL RESOURCES:

Canola Council of Canada / 1-866-834-4378 / www.canolacouncil.org
Alberta Agriculture and Forestry / 310-FARM (3276) / www.agriculture.alberta.ca
Alberta Canola Producers Commission / 1-800-551-6652 / www.canola.ab.ca

CANOLA - NAPUS

	S	F	R	C
6074 RR				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
McNaughton, Brian / Lethbridge / AB / (403) 308-9914				C
CS2000				
BI: DL Seeds, Dist: Canterra Seeds				
McNaughton, Brian / Lethbridge / AB / (403) 308-9914				C
FUSION				
BI: DL Seeds, Dist: SeCan Members				
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617				C
HYHEAR 1				
BI: N/A, Dist: N/A				
McNaughton, Brian / Lethbridge / AB / (403) 308-9914				C
RUGBY				
BI: N/A, Dist: Canterra Seeds				
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617				C
UA ALFAGOLD				
BI: U of Alberta, Dist: N/A				
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500	S	F		C
UA BOUNTYGOLD				
BI: U of Alberta, Dist: N/A				
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500	S	F		C

FLAX

	S	F	R	C
AAC BRAVO				
BI: AAFC (Lacombe), Dist: FP Genetics				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R	
Wheatcrest Farms / Lomond / AB / (403) 792-3696			R	
CDC PLAVA				
BI: CDC, Dist: N/A				
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500	S			
Stamp Seeds / Enchant / AB / (403) 739-2233		F		
PRAIRIE SAPPHIRE				
BI: AAFC (Morden), Dist: SeCan Members				
Feenstra, Lloyd / Barons / AB / (403) 757-3737				C
Stamp Seeds / Enchant / AB / (403) 739-2233	S	F	R	C*
WESTLIN 70				
BI: N/A, Dist: CPS (Canada) Inc.				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
WESTLIN 71				
BI: N/A, Dist: CPS (Canada) Inc.				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736	S	F		
WESTLIN 72				
BI: N/A, Dist: CPS (Canada) Inc.				
Wheatcrest Farms / Lomond / AB / (403) 792-3696		R		

FLAX - RECONSTITUTED

	S	F	R	C
***ACR: Eligible pedigreed class for crops subject to developer's post-harvest Additional Certification Requirements, such as seed testing required for varieties of reconstituted flax.**				
CDC GLAS				
BI: CDC, Dist: SeCan Members				
Corns, Bryan & Gary / Grassy Lake / AB / (403) 655-2464				C
Crooymans, John & Joseph & Andrew / Bow Island / AB / (403) 580-7264*			R	C
Dyck, Heinz W. & Colin & Alan & Kelton / Rosemary / AB / (403) 378-3321*				C
Hoff, Peter Edward / Gleichen / AB / (403) 734-2140	S	F	R	
Hoffmann, Curtis / Oyen / AB / (403) 664-9617*				C
Holmstrom, Darrell & Barbara / Killam / AB / (780) 385-3574*			R	
Huvenaars, Carl / Hays / AB / (403) 725-2213*			R	C
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409				C
Lefsrud, Kevin J. & Edmund J. / Viking / AB / (780) 336-2500*				C
Stamp Seeds / Enchant / AB / (403) 739-2233*				C
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476*				C
CDC SANCTUARY				
BI: CDC, Dist: SeCan Members				
Huvenaars, Carl / Hays / AB / (403) 725-2213*				C
CDC SORREL				
BI: CDC, Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383*			R	
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330*			R*	C
Zwack, Thomas / Daysland / AB / (780) 374-2450*				C

ALFALFA

	S	F	R	C
2010				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
3010				
BI: N/A, Dist: BrettYoung Seeds Ltd.				C
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
4030				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
Friesen, Raymond / Fort Vermilion / AB / (780) 927-4803		F		
4010BR				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
4020MF				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
Friesen, Danny Jim / Fort Vermilion / AB / (780) 927-4900				C
Torrie, Leron / Grassy Lake / AB / (403) 915-0625				C
54Q14				
BI: N/A, Dist: DuPont Pioneer				
Vanderstoel, Jeroen & Maureen / Enchant / AB / (403) 654-2653				C
54Q25				
BI: N/A, Dist: DuPont Pioneer				
Cailliau, John & Dana & S. & Dave & D. / Enchant / AB / (403) 739-3100				C
55Q27				
BI: N/A, Dist: DuPont Pioneer				
Cailliau, John & Dana & S. & Dave & D. / Enchant / AB / (403) 739-3100				C
AC BRADOR				
BI: N/A, Dist: Semican				
Nikkel, Ed / Lethbridge / AB / (403) 792-2116				C
ALGONQUIN				
BI: N/A, Dist: Pask Farms Ltd.				
Cailliau, John & Dana & S. & Dave & D. / Enchant / AB / (403) 739-3100				C
ASCEND				
BI: N/A, Dist: La Coop Federee				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
BARRICADE SLT				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
COMPASS				
BI: N/A, Dist: N/A				
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444				C
CONCEPT				
BI: N/A, Dist: Quality Seeds Ltd.				
Meyer, Ben / Rolling Hills / AB / (403) 964-2788				C
DALTON				
BI: AAFC, Dist: AAFC				
Vanderstoel, Jeroen & Maureen / Enchant / AB / (403) 654-2653				C
EQUINOX				
BI: Forage Genetics, Dist: CPS (Canada) Inc.				
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444				C
Nikkel, Ed / Lethbridge / AB / (403) 792-2116				C
FORTUNE				
BI: N/A, Dist: DLF Pickseed				
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444				
FOUNDATION APR				
BI: N/A, Dist: Gold Medal Seeds				
Virostek, Derek / Rolling Hills / AB / (403) 633-0520				C
HALO				
BI: N/A, Dist: CPS (Canada) Inc.				
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444				C
INSTINCT				
BI: N/A, Dist: DLF Pickseed				
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444				C
Nikkel, Ed / Lethbridge / AB / (403) 792-2116				C
LEGENDAIRY XHD				
BI: N/A, Dist: Gold Medal Seeds				
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444				C
LELIA				
BI: N/A, Dist: Quality Seeds Ltd.				
Nikkel, Ed / Lethbridge / AB / (403) 792-2116				C
MASKA				
BI: AAFC, Dist: AAFC				
Vanderstoel, Jeroen & Maureen / Enchant / AB / (403) 654-2653				C

POWER 4.2
BI: N/A, Dist: Power Seed Inc.
Nikkel, Ed / Lethbridge / AB / (403) 792-2116 C
PV ULTIMA
BI: N/A, Dist: N/A
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 F C
RAMBLER
BI: N/A, Dist: DLF Pickseed
Kerschbaumer, John A. / Fairview / AB / (780) 835-4508 C
REBOUND PLUS
BI: N/A, Dist: Gold Medal Seeds
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
Nikkel, Ed / Lethbridge / AB / (403) 792-2116 C
SHOCKWAVE-BR
BI: N/A, Dist: BrettYoung Seeds Ltd.
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069 C
SHOWDOWN
Nikkel, Ed / Lethbridge / AB / (403) 792-2116 C
SPREDOR 4
BI: Forage Genetics, Dist: CPS (Canada) Inc.
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
Nikkel, Ed / Lethbridge / AB / (403) 792-2116 C
SPREDOR 5
BI: N/A, Dist: Gold Medal Seeds
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
Nikkel, Ed / Lethbridge / AB / (403) 792-2116 C
STOCKPILE
BI: N/A, Dist: BrettYoung Seeds Ltd.
Giesbrecht, Peter W. / Vauxhall / AB / (403) 622-2297 C
Versteegen, Erik / Rolling Hills / AB / (403) 964-2740 C

STRONGHOLD
BI: N/A, Dist: Gold Medal Seeds
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
SURVIVOR
BI: N/A, Dist: Seed-Link Inc.
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069 C
VALID
BI: N/A, Dist: Quality Seeds Ltd.
Nikkel, Ed / Lethbridge / AB / (403) 792-2116 C
VERDANT
BI: N/A, Dist: Gold Medal Seeds
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
VR TOTAL
BI: N/A, Dist: CPS (Canada) Inc.
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
WL 319HQ
BI: N/A, Dist: Gold Medal Seeds
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
WL353LH
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
WL354HQ
Gold Medal Seeds Limited / Brooks / AB / (403) 362-3444 C
YELLOWHEAD
BI: AAFC, Dist: AAFC
Kerschbaumer, John A. / Fairview / AB / (780) 835-4508 C

BROMEGRASS

	S	F	R	C
AC KNOWLES				
BI: AAFC (Saskatoon), Dist: CPS (Canada) Ltd.				
Dechant, Clem / Hotchkiss / AB / (780) 836-2715				C
ADMIRAL				
BI: AAFC, Dist: N/A				
Card, Gordon B. & Rhett / Magrath / AB / (403) 758-3444				C
CARLTON				
BI: AAFC (Saskatoon), Dist: Phillips' Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
Downey, Gordon / Manning / AB / (780) 836-2292				C
Enns, Walter / Clayhurst / BC / (250) 781-3357				C
Froese, Cornelius H. / La Crete / AB / (780) 927-4645				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746		F		C
Hanson, Troy / Valhalla Centre / AB / (587) 343-2286				C
Hegland, David Olaf / Wembley / AB / (780) 766-2450				C
Kerschbaumer, John A. / Fairview / AB / (780) 835-4508				C
Sallis, Gary / Manning / AB / (780) 836-2381				C
Zaderey, Kevin / Lloydminister / AB / (780) 875-0007				C
FLEET				
BI: AAFC (Saskatoon), Dist: SeCan Members				
Andersen, Terry / Bon Accord / AB / (780) 916-5712		F		C
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746		F		C
Hanson, Troy / Valhalla Centre / AB / (587) 343-2287				C
Kerschbaumer, John A. / Fairview / AB / (780) 835-4508				C
Koester, Gordon & Munro, Daniel / Rockyford / AB / (403) 533-2248				C
Van Garderen, Kees / Picture Butte / AB / (403) 738-4203				C
Vanderstoel, Jeroen & Maureen / Enchant / AB / (403) 654-2653				C
MANCHAR				
BI: N/A, Dist: No Rep				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C
PEAK				
BI: N/A, Dist: Quality Seeds Ltd.				
Moskalyk, Kent / Fairview / AB / (780) 835-8378				C
YORK				
BI: N/A, Dist: Quality Seeds Ltd.				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C

CICER MILKVETCH

	S	F	R	C
ARC ASPEN				
BI: CDC, Dist: N/A				
Andersen, Terry / Bon Accord / AB / (780) 916-5712				C
VELDT				
BI: CDC, Dist: N/A				
Vanderstoel, Jeroen & Maureen / Enchant / AB / (403) 654-2653				C

CLOVER

	S	F	R	C
FRIDA				
BI: N/A, Dist: FP Genetics				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
JULIET				
BI: N/A, Dist: BrettYoung Seeds Ltd.				
Downey, Gordon / Manning / AB / (780) 836-2292				C

FESCUE

	S	F	R	C
BOREAL				
BI: AAFC (Beaverlodge), Dist: CPS (Canada) Inc.				
Carlstad, Tyler / Bear Canyon / AB / (780) 835-0505				C
Jones, Danny / Beaverlodge / AB / (780) 354-8089				C
Moore Seed Processors Inc. / Debolt / AB / (780) 957-3964				C
Richard, Gerald / Spirit River / AB / (780) 864-2339				C
Richard, Michel / Spirit River / AB / (780) 864-4220				C
ORACLE				
BI: AAFC (Beaverlodge), Dist: CPS (Canada) Inc.				
Foster, Norman R. / Beaverlodge / AB / (780) 354-2107				C
Hegland, David Olaf / Wembley / AB / (780) 766-2450				C
PARDUS				
BI: N/A, Dist: Northstar Seed Ltd.				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C
PRADEL				
BI: N/A, Dist: Northstar Seed Ltd.				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C

ORCHARDGRASS

	S	F	R	C
KILLARNEY				
BI: AAFC, Dist: N/A				
Card, Gordon B. & Rhett / Magrath / AB / (403) 758-3444				C

RYEGRASS

	S	F	R	C
NORLEA				
BI: N/A, Dist: SeCan Members				
Hadland, Edward / Baldonnel / BC / (250) 793-9746				C
SWIFT				
BI: N/A, Dist: SeCan Members				
Whitney, David / Fairview / AB / (780) 835-4897				C

TIMOTHY

	S	F	R	C
ALMA				
BI: N/A, Dist: Moore Seed Processors Inc.				
Moore Seed Processors Inc. / Debolt / AB / (780) 957-3964				C
BARPENTA				
BI: N/A, Dist: Union Forage				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C
CLIMAX				
BI: N/A, Dist: DLF Pickseed				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
COMTAL				
BI: N/A, Dist: DLF Pickseed				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				
Moore Seed Processors Inc. / Debolt / AB / (780) 957-3964				C
DERBY				
BI: N/A, Dist: Growmark				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069		F		
DOLINA				
BI: N/A, Dist: Semican				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
PROMESSE				
BI: BrettYoung Seeds Ltd., Dist: BrettYoung Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
RICHMOND				
BI: N/A, Dist: DLF Pickseed				
Raaen, Sylvan / Rolla / BC / (250) 759-4778				C
TENHO				
BI: Boreal Plant Breeding (Finland), Dist: Moore Seed Processors				
Moore Seed Processors Inc. / Debolt / AB / (780) 957-3964				C
TITAN (LISCHKA IN GERMANY)				
BI: N/A, Dist: Northstar Seed Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C
TUUKKA				
BI: Boreal Plant Breeding (Finland), Dist: Moore Seed Processors				
Moore Seed Processors Inc. / Debolt / AB / (780) 957-3964				C
WINNETOU				
BI: N/A, Dist: Parsons Seeds Ltd.				
BrettYoung Seeds Ltd. / Rycroft / AB / (780) 765-3069				C

WHEATGRASS

	S	F	R	C
AC SALTLANDER				
BI: AAFC, Dist: N/A				
Miller, Kenneth F. / Milk River / AB / (403) 647-2127		F		C
ELBEE				
BI: N/A, Dist: SeCan Members				
Limoges, Daniel / Girouxville / AB / (780) 833-1287		F		
FAIRWAY				
BI: N/A, Dist: FP Genetics				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C
Whitney, David / Fairview / AB / (780) 835-4897				C
GREENLEAF				
BI: N/A, Dist: SeCan Members				
Card, Gordon B. & Rhett / Magrath / AB / (403) 758-3444				C
KIRK				
BI: AAFC (Saskatoon), Dist: SeCan Members				
Dynamic Seeds Ltd. / Fairview / AB / (780) 835-5435				C
Hadland, Arthur Austin / Baldonnel / BC / (250) 789-3566				C
Limoges, Daniel / Girouxville / AB / (780) 833-1287				C
NEWKIRK				
BI: AAFC, Dist: N/A				
Limoges, Daniel / Girouxville / AB / (780) 833-1287		F		

CHICKPEAS

	S	F	R	C
CDC LEADER				
BI: CDC, Dist: N/A				
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434		F	R	
CDC ORION				
BI: CDC, Dist: N/A				
Kiffiak, Nathan & Mercer, Ryan / Foremost / AB / (403) 867-2338	S			
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S	F	R	

FABA BEANS

	S	F	R	C
CDC SNOWDROP				
BI: CDC, Dist: N/A				
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515				C
Jackson, Thomas / Killam / AB / (780) 385-2332			R	
Kittle, James William & Andrew / Viking / AB / (780) 336-2583				C
Kopjar, Gerald M. / Rowley / AB / (403) 368-2409			R	
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111			R	
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617	S	F		
CDC SSNS-1				
Plett, Donald H. / Gem / AB / (403) 641-2494			R	
FABELLE				
Stamp Seeds / Enchant / AB / (403) 739-2233	S	F		
FB 9-4				
Stamp Seeds / Enchant / AB / (403) 739-2233	S*	F*	R	C*
SNOWBIRD				
BI: Innoseeds, Dist: Bob Park				
Baier, Bill & Dean / Clyde / AB / (780) 348-5791				C
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515			R	C
Cyre, Clifford & Greg / Barrhead / AB / (780) 349-4775	S	F	R	C
Foster, Norman R. / Beaverlodge / AB / (780) 354-2107			R	C
Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036			R	C
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268			R	C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240	S	F	R	C
Plante, Jacques / St. Paul / AB / (780) 645-4604				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358				C*
Stamp Seeds / Enchant / AB / (403) 739-2233				C
True Seeds Ltd. / Redwater / AB / (780) 777-5885				C
TABASCO				
BI: Norddeutsche Pfanzenzucht, Dist: DL Seeds				
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617				C

HEMP

	S	F	R	C
FINOLA				
BI: N/A, Dist: N/A				
Nieboer, Nathan / Bow Island / AB / (403) 545-2222				C
GRANDI				
BI: N/A, Dist: N/A				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
SILESIA				
BI: N/A, Dist: N/A				
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018				C

LENTILS

	S	F	R	C
CDC GREENSTAR				
BI: CDC, Dist: N/A				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Hoffmann, Curtis / Oyen / AB / (403) 664-9617				C
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434			R	
CDC IMAX				
BI: CDC, Dist: N/A				
Huvenaars, Carl / Hays / AB / (403) 725-2213			R	
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736			R	
Witdouck, Dale / Iron Springs / AB / (403) 738-4395			R	
CDC IMPULSE				
BI: CDC, Dist: N/A				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900			R	
Hoffmann, Curtis / Oyen / AB / (403) 664-9617				C
Kiffiak, Nathan & Mercer, Ryan / Foremost / AB / (403) 867-2338	S			
Kiffiak, Nathan J. & Anderson, Tim / Foremost / AB / (403) 867-2338		F		
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S	F	R	
Witdouck, Dale / Iron Springs / AB / (403) 738-4395				C
CDC MARBLE				
BI: CDC, Dist: N/A				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900			R	
CDC MAXIM				
BI: CDC, Dist: N/A				
Richard, Gerald / Spirit River / AB / (780) 864-2339			R	C
CDC PROCLAIM (H)				
BI: CDC, Dist: N/A				
Forward Seed Farm / County Of Barrhead / AB / (780) 674-3822			R	
Stamp Seeds / Enchant / AB / (403) 739-2233				C*
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S	F	R	

MUSTARD

	S	F	R	C
AC VULCAN				
BI: AAFC, Dist: N/A				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C
ANDANTE				
BI: AAFC, Dist: N/A				
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736				C

PEAS

	S	F	R	C
AAC BARRHEAD				
BI: AAFC, Dist: N/A				
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595	S	F		
AAC CARVER				
BI: AAFC, Dist: Canterra Seeds				
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R	
Wuthrich, David / Cecil Lake / BC / (250) 781-3527	S	F		
AAC COMFORT				
BI: AAFC, Dist: Canterra Seeds				
Lindholm Seed Farm / New Norway / AB / (780) 352-3240	S			
AAC LACOMBE				
BI: AAFC, Dist: SeedNet				
Benci, Dennis / Carmangay / AB / (403) 643-2294	S	F	R	
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900	S		R	
Ellis, Brian / Olds / AB / (403) 556-2890			R	C
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072			R	
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268			R	
Hoffmann, Curtis / Oyen / AB / (403) 664-9617				C
Huvenaars, Carl / Hays / AB / (403) 725-2213			R	
Huvenaars, John & Lisa / Hays / AB / (403) 725-2126			R	
Jensen, Albert / Drumheller / AB / (403) 823-9976				C
Jensen, Colin / Drumheller / AB / (403) 820-0181				C
Jonk, Nicholas / Westlock / AB / (780) 349-5458			R	
Kiffiak, Nathan J. & Anderson, Tim / Foremost / AB / (403) 867-2338			R	
Kittle, James William & Andrew / Viking / AB / (780) 336-2583			R	
Macyk, Tim / Radway / AB / (780) 699-4073			R	C
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708	S	F	R	C
Mercer Seeds Ltd. / Lethbridge / AB / (403) 327-9736	S		R	C
Forward Seed Farm / County Of Barrhead / AB / (780) 674-3822			R	C
Oatway's Seed Farm / Clive / AB / (403) 784-3001			R	C
Stamp Seeds / Enchant / AB / (403) 739-2233			R	C
True Seeds Ltd. / Redwater / AB / (780) 777-5885			R	C
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018			R	
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476			R	
Welsh, Donald Alan / Milk River / AB / (403) 647-2228				C
Welsh, Stuart Jason / Milk River / AB / (403) 647-2228			R	C
Wheatcrest Farms / Lomond / AB / (403) 792-3696	S		R	
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434			R	C
Witdouck, Dale / Iron Springs / AB / (403) 738-4395			R	C
AAC PEACE RIVER				
BI: AAFC, Dist: FP Genetics				
Hadland, Edward / Baldonnel / BC / (250) 793-9746		F	R	C
Mastin, Robert B. / Sundre / AB / (403) 556-2609			R	C
AAC RADIUS				
BI: AAFC, Dist: N/A				
Klempnauer, Joerg / Vauxhall / AB / (403) 655-2420			R	
AAC ROYCE				
BI: AAFC, Dist: N/A				
Klempnauer, Joerg / Vauxhall / AB / (403) 655-2420		F		
ABARTH				
BI: Limagrain, Dist: FP Genetics				
Airth, Jock & Linda / Brooks / AB / (403) 362-4372				C
Nieboer, Nathan / Bow Island / AB / (403) 545-2222				C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251				C
CDC AMARILLO				
BI: CDC, Dist: Sask. Pulse Growers				
Bell, D. Leslie / Drumheller / AB / (403) 823-9462				C
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515				C
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456			R	
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / AB / (780) 856-2383				C
Dewindt, Harry & Renee / Thorhild / AB / (780) 398-2377				C
Ellis, Brian / Olds / AB / (403) 556-2890				C

Galloway Farms / Fort Saskatchewan / AB / (780) 998-3036				C
Harbin, Clifford T. & Bruce C. / Rivercourse / AB / (780) 745-2268				C
Harris, William P. & Linda & Thomas & A. / Beaverlodge / AB / (780) 354-2823			R	C
Hill, Gordon P. & Blair / Taylor / BC / (250) 789-3469	S	F		
Hoff, Peter Edward / Gleichen / AB / (403) 734-2140	S	F	R	C
Hoffmann, Curtis / Oyen / AB / (403) 664-9617				C
Jackson, Thomas / Killam / AB / (780) 385-2332				C
Kapitski, Lawrence / Andrew / AB / (780) 365-2134				C
Limoges, Richard / McLennan / AB / (780) 324-2335			R	C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240			R	
Pare, Raymond A. / Wainwright / AB / (780) 842-2073	S	F	R	
Penwest Seeds / Three Hills / AB / (403) 443-2577	S			C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251				C
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322			R	C
Sim, Darwin & Derek / Ponoka / AB / (780) 372-2111				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S	F*	R	C
True Seeds Ltd. / Redwater / AB / (780) 777-5885			R	C
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018			R	C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F	R	
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476			R	
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434			R	C
CDC BLAZER				
BI: CDC, Dist: Sask. Pulse Growers				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900	S	F		
CDC GOLDEN				
BI: CDC, Dist: N/A				
Degenhardt, Keith & Terry L. & Kerry / Hughenden / AB / (780) 856-2383				C
CDC GREENWATER				
BI: CDC, Dist: Sask. Pulse Growers				
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900		F		
Hallett, Dale R. & Richard / Carstairs / AB / (403) 337-3072				C
Hoff, Peter Edward / Gleichen / AB / (403) 734-2140	S		R	
Knight, William & Craig & Brian / Tees / AB / (403) 784-3633			R	
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358		F*	R	
Thompson, M. Ellwood & Kelly / Red Deer County / AB / (403) 728-3535				R
CDC HORIZON				
BI: CDC, Dist: N/A				
Foster, Norman R. / Beaverlodge / AB / (780) 354-2107				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746			R	
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F*		C*
CDC INCA				
BI: CDC, Dist: N/A				
Jacula, Dean S. & Shawn D. / Vermilion / AB / (780) 581-9011	S			
Kiffiak, Nathan & Mercer, Ryan / Foremost / AB / (403) 867-2338	S			
Markert Seed Ltd. / Vulcan / AB / (403) 485-6708	S	F	R	
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358	S			
Van Roessel, William & Jean / Bow Island / AB / (403) 545-6018		F		
Welsh, Donald Alan / Milk River / AB / (403) 647-2228	S			
Willms, Henry & Timothy H. / Grassy Lake / AB / (403) 655-2434	S			
CDC LEROY				
BI: CDC, Dist: N/A				
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358			R*	C*
CDC LIMERICK				
BI: CDC, Dist: Sask. Pulse Growers				
Brummelhuis, Mitchell & Mack / Vauxhall / AB / (403) 654-7515			R	
Howard, Fred / Wanham / AB / (780) 694-2427			R	
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330			R	
Lindholm Seed Farm / New Norway / AB / (780) 352-3240	S	F	R	C
McDonald, Gerald / Co. Of Grande Prairie #1 / AB / (780) 538-3868				C
Sayer, Roger / Carstairs / AB / (403) 337-5847				C*
Sendziak, Don P. & Stephen / Edmonton / AB / (780) 434-1322			R	
Shultz, Shawn / Didsbury / AB / (403) 335-3694				C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F	R	
CDC MEADOW				
BI: CDC, Dist: N/A				
Bartlett, Gregg / Fairview / AB / (780) 835-4288				C
Benci, Dennis / Carmangay / AB / (403) 643-2294			R	
Chin Ridge Seeds Ltd. / Taber / AB / (403) 223-3900				C
Davidson, E. Daryl & Dean / Kitscoty / AB / (780) 846-2456				C
Foster, Norman R. / Beaverlodge / AB / (780) 354-2107				C
Hadland, Edward / Baldonnel / BC / (250) 793-9746		F	R	
Hadway, W. Tom & Carol / Didsbury / AB / (403) 335-4929				C
Hartzler, Leonard / Carstairs / AB / (403) 337-2416				C
Kapitski, Lawrence / Andrew / AB / (780) 365-2134				C
King, Harold & Webb, David G. / Three Hills / AB / (403) 443-7330				C
Kittle, James William & Andrew / Viking / AB / (780) 336-2583				C
Koester, Gordon & Munro, Daniel / Rockyford / AB / (403) 533-2248				C

Limoges, Richard / McLennan / AB / (780) 324-2335			R	C
Lindholm Seed Farm / New Norway / AB / (780) 352-3240				C
Massey, Derwin / Stettler / AB / (403) 883-2503				C
Meinczinger, Matthew Jr. / Busby / AB / (780) 349-2456				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / AB / (780) 674-2595				C
Nemetz, Charlie & Jerritt & Lewis & Brandon / Stettler / AB / (403) 742-0436				C
Page, Dan / Didsbury / AB / (403) 335-4563				C
Pare, Raymond A. / Wainwright / AB / (780) 842-2073			R	
Radke, Bryan Victor / Barrhead / AB / (780) 674-5715	S	F		C
Rewerts, Ken / Fairview / AB / (780) 835-3474				C
Richard, Gerald / Spirit River / AB / (780) 864-2339				C
Richards, Cliff & Dan / Sexsmith / AB / (780) 766-2266				C
Sich, Louis John & Ivan & Martin / Trochu / AB / (403) 442-2112				C
Solick, Leonard & Kelsey & Corwin / Halkirk / AB / (403) 884-2358				C
Weigum, Garry & Sarah / Three Hills / AB / (403) 443-2476				C
Wood, Robert & Patricia & Marshall / Bowden / AB / (403) 224-3928				C
CDC PATRICK				
BI: CDC, Dist: N/A				
Sich, Louis John & Ivan & Martin / Trochu / AB / (403) 442-2112				C
Warkentin, Harold K. & Errol / Beaver County / AB / (780) 662-2617		F*	R*	C*
CDC PLUTO				
BI: CDC, Dist: N/A				
Stamp Seeds / Enchant / AB / (403) 739-2233				C
CDC RAEZER				
BI: CDC, Dist: N/A				
Baier, Bill & Dean / Clyde / AB / (780) 348-5791				C
Dewindt, Harry & Renee / Thorhild / AB / (780) 398-2377				C
Good, Lindsey / Carstairs / AB / (403) 546-7096				C
Hill, Gordon P. & Blair / Taylor / BC / (250) 789-3469	S	F		
Knight, William & Craig & Brian / Tees / AB / (403) 784-3633			R	
Krywko, Ronald / Sturgeon County / AB / (780) 459-8224	S	F		C
Plante, Jacques / St. Paul / AB / (780) 645-4604				C
Sand, Ron W. & David R. / McLaughlin / AB / (780) 745-2251				C
Sayer, Roger / Carstairs / AB / (403) 337-5847			R*	C
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Agriculture Without Sex

Why a method of asexual seed production called apomixis could be a key to feeding the world.

MANY consider it one of the most important questions facing the world today: How to feed the nine billion people expected to populate the planet by 2050?

One answer: Eliminate sex from agriculture.

That's the vision of Tim Sharbel, a world leader in the study of asexual seed production known as apomixis. Born and educated in Montréal, Sharbel spent 20 years doing pioneering work in Germany before moving back to Canada last year to help launch an apomixis research program at the Global Institute for Food Security, located at the University of Saskatchewan in Saskatoon.

Apomixis is a naturally occurring phenomenon in certain types of plants such as St. John's wort and Kentucky bluegrass, which reproduce seed asexually, whereby all offspring are genetically identical to the mother plant.

It isn't found in any food crops — but if apomixis could be successfully introduced into agriculture, Sharbel envisions this would have huge implications for humankind.

"Everyone is scrambling around right now trying to figure out how we're going to feed the world, so that's why this is so important to be talking about," he says. "It's not the only solution that scientist are looking into, but it is one potential answer which would change everything."

Sharbel describes the practical application of apomixis in food crops as a potentially disruptive technology that could inspire an agricultural revolution, since it would enable the immediate fixation of any desired genotype and lead to faster, simpler breeding schemes.

"I think people have been studying the biology of these asexual plants and animals for 100 years or so, but it's only 20 or 30 years ago that people started thinking about it in terms of agriculture," Sharbel says. "There are a number of laboratories and a lot of people around the world studying apomixis because of its implications. It's worth billions and billions of dollars if we can get it working."

Photo: Global Institute for Food Security

Members of the apomixis research team at work at the Global Institute for Food Security in Saskatoon. Pictured are (left to right): Dorota Paczesniak, Angie Li and Andres Posso-Terranova.

Through their applied work on apomixis, Sharbel and his team are uncovering clues to this evolutionary puzzle. Their research program encompasses population genetics and evolutionary theories, functional genetics and an assortment of technologies such as high throughput phenotyping, genomics, proteomics and genome editing to carefully analyze reproduction in asexual plants (typically hybrids or polypoids) and apply that knowledge to food crops.

Sharbel's research involving plants in the wild brassica genus Boechera has resulted in the isolation of two genes, APPOLO and UPGRADE, which appear to have pivotal functions in the transition to apomixis. Variants of the genes are currently being tested in canola.

"We've advanced very rapidly and have identified some candidate genes that we're working with," Sharbel says. "Proof of concept is where we're at right now. … We'll know within six months or so if the genes are actually working."

Sharbel and his team are using a GMO approach in their current testing, but ultimately the goal is to utilize other biotechnologies such as genome editing, which essentially allows scientists to target mutations in a plant's DNA and does not involve genetic transformation.

"We need to identify by using proof of concept whether we can get the trait to work, and that can be a genetically modified approach because it's not going to market. Once we identify whether we can get it to work, then the question is how do you engineer it into crops?" Sharbel says.

"What's likely to happen is non-GMO technologies will be used to introduce the trait into the crops. Therefore, you wouldn't run into consumers not wanting to consume GMOs or regulatory processes that apply to GMOs as well."

High Risk Research

Sharbel, who describes his work as "high risk," says it's difficult to predict the results of his testing, since apomixis is such a complicated form of reproduction. "It could work right away or it could take another five years or longer," he notes, adding his team has similar projects underway with crops other than canola, such as corn, chickpeas and lentils, which are in different stages of development.

If apomixis can be successfully applied to agriculture, Sharbel says, it would likely be a game changer for the seed industry. That's because growers who now choose to buy pedigreed seed every year from seed suppliers could conceivably only have to buy seeds with the enhanced traits they're seeking just once.

"Think of apoxmixis as a switch to turn sex on or to turn sex off," he says. "If we had that switch and we could use that, then the farmer would get his first generation hybrid seed [which produce] these hybrids that propagate clonally from then on. Those first generation hybrids will produce genetic copies of themselves and subsequent generations."

Tim Sharbel is a world leader in the study of asexual seed production known as apomixes.

Sharbel believes seed companies would be more than compensated for any lost sales in this scenario by the fact they'd be spending far less money to produce seeds with new and better traits — which would likely still be in high demand in the marketplace.

"Right now, it takes as many generations to produce these inbred hybrids and perform the necessary crosses," he says. "Instead of producing these hybrids every eight to 10 generations, you could now produce hybrids in one generation, so it would save companies huge amounts of time and investment to produce these hybrid lines."

The result, Sharbel says, is that seed companies and breeders could concentrate their efforts on developing many different types of crop varieties adapted to specific environmental conditions and/or agricultural and economic needs. This diversity, coupled with the ability to rapidly change seed production, would benefit growers and be a boon to food production overall, he adds.

"If it works, then we'll be able to do things like niche breeding, meaning farmers from southern Saskatchewan and northern Saskatchewan would get two different kinds of seeds rather than the one-size-fits-all kind of seed they get presently from companies," Sharbel says.

Mark Halsall

INNOVATION SHOWCASE

New products from **BrettYoung, FP Genetics, SeCan** and **Thunder Seeds** to benefit Alberta growers in 2017.

New DefendR Disease Resistance Genetic Traits

BRETTYOUNG is proud to introduce the innovative DefendR™ trait platform as part of an active disease management strategy. The DefendR designation will be used to denote genetic resistance/tolerance to the big three disease complexes affecting canola: Sclerotinia, Clubroot and Blackleg.

DefendR is reserved for use on BrettYoung varieties that deliver significantly above industry-average levels of genetic resistance or tolerance to one or more of the prominent canola diseases. It is a nod to the strength of the breeding program of BrettYoung's primary canola breeding partner, DL Seeds, and a promise to canola growers they are purchasing a variety that has leading genetics for disease management coupled with exceptional yield potential.

One of the first BrettYoung varieties to carry the innovative DefendR trait is 6076 CR, a Genuity® Roundup Ready® canola hybrid. 6076 CR offers the complete DefendR trait platform package in a high-yielding hybrid.

6076 CR carries the DefendR Clubroot resistant trait that is resistant to all previously identified pathotypes (2, 3, 5, 6 and 8) but also has intermediate (moderate) resistance to the recently identified 5X pathotype. In 2013, the 5X Clubroot pathotype was identified in Alberta when the canola varieties thought to be Clubroot resistant were showing significant levels of infection.

In addition to the DefendR Clubroot trait, 6076 CR also carries the DefendR Sclerotinia and Blackleg traits. The DefendR Blackleg trait incorporates multiple major genes to defend against more than one strain of Blackleg and attains a broader level of resistance compared to non-multigenic R rated canola varieties. This multi-genic (major gene) resistance to Blackleg provides a strong R (resistant) rating.

The DefendR Sclerotinia trait provides improved tolerance to Sclerotinia. Tolerance will reduce impacts of infection and reduce yield loss wherever disease pressure is present. Screening and test results have shown tolerance superior to susceptible checks in reaction to inoculation with Sclerotinia *sclerotiorum* using industry-approved standardized testing protocol.

In addition to the DefendR disease resistance package, 6076 CR is a large plant with excellent harvestability. In the 2015 BrettYoung Comparison Trials (BCTs), 6076 CR yielded on average four per cent higher than the competitor variety DKL 74-44 across 19 western Canadian sites. Each site is a field scale, farmer managed, replicated field trial, managed by an independent company in cooperation with the farmer. Check the BrettYoung website for up-to-date 2016 results later this fall.

Innovation at its best. Look for BrettYoung's DefendR disease resistant traits layered into their top-performing line-up of canola hybrids.

BrettYoung™
DISTINCT BY DESIGN

In addition to the DefendR Clubroot trait, 6076 CR also carries the DefendR Sclerotinia and Blackleg traits.

Hybrid Rye Offers Innovation and Profit for Commercial Growers

THE acreage trend of fall rye has been dropping for the last 10 years according to Stats Canada crop reports. Many market analysts expected the trend to continue and indicate that lack of innovation has left the crop behind and it was no longer a competitive crop for most growers. But FP Genetics Inc., along with breeding partner KWS and FP Genetics' grain partners, have been striving to change the current image of fall rye crops in Canada. With the release of two hybrid fall rye varieties – Brasetto and Bono – since 2015, they are changing the landscape for commercial growers of winter cereals to a very profitable market by delivering the quality needed by end-use customers in the consumptive market.

Rod Merryweather, CEO of FP Genetics, says their first few years of results with their new hybrid fall rye Brasetto, and now Bono, is winning over many farmers who focus on maximum economic returns. "The results are far exceeding expectations of yield and quality for our growers. Yields in excess of 95 bushels per acre has not been uncommon and quality has exceeded the expectations of end-users.

"Hybrid rye is a totally different crop than its open-pollinated cousin," adds Merryweather. "That means it's targeted to be grown on highly productive land with good agronomics so yield, and ultimately profit, can be maximized for the grower. It will never be a major crop but we believe there is a premium market for rye that will make it interesting to many growers. This market could account for 50,000 acres of production per year and maybe more. Longer term, we are look at the feed and industrial markets which could add even more acres to the opportunity."

FP Genetics believes growers can realize yields over 100 bu/ac with Brasetto and Bono, as they gain experience with the crop. FP Genetics is working with growers and the industry to understand what hybrid rye is capable of and the profit opportunities for commercial growers when higher management levels are applied to this crop.

FP Genetics is dedicated to providing superior seed genetics to western Canadian farmers through 153 local seedsmen that own the company. Recognized as a leader in the cereal seed business, they license leading genetics from breeding companies around the globe, producing and distributing pedigreed seed to commercial farmers who want the most profitable seed varieties.

FP Genetics believes growers can realize yields over 100 bu/ac with Brasetto and Bono, as they gain experience with the crop.

Stronger Fields. Soaring Yields

SECAN is Canada's leading supplier of cereal genetics. For 2017 we're excited to launch three new products for Alberta farmers.

AAC Foray VB is the highest yielding CPSR to ever come out of the Coop trials. It is a midge tolerant wheat with strong straw, improved protein content and good disease resistance. AAC Foray VB is resistant to leaf rust, has moderate resistance to stem rust and intermediate resistance to bunt and FHB. AAC Penhold is the refuge in AAC Foray VB for added straw strength. AAC Foray VB should be an exceptional fit for all CPS growing areas, especially those prone to the orange wheat blossom midge.

Strengths:

- grain yield 108% of 5701PR and 119% of 5700PR (average of all sites in 2010 to 2012 High Yield Wheat Registration trials)
- very large kernel with heavy kernel weight
- early maturing, 1 day earlier than 5700PR
- improved protein over 5700PR and 5701PR
- good sprouting tolerance
- resistant to leaf rust
- intermediate resistance to bunt and FHB

AAC Spitfire is a conventional Canada Western Amber Durum with excellent grain yield potential, good lodging tolerance, and a good disease package. AAC Spitfire is similar to AC® Strongfield in maturity, test weight, height and low cadmium content. AC® Strongfield has been the number one durum in western Canada for 10 years – AAC Spitfire looks like a great replacement.

Strengths:

- 110% higher grain yield than AC® Strongfield
- improved lodging tolerance compared to AC® Strongfield with slightly shorter straw
- resistant to common bunt as well as stem, leaf and stripe rust
- maturity = AC® Strongfield

CDC Bradwell is an awned CWRS variety that when compared to AC® Cardale has +3% grain yield advantage and superior straw strength. CDC Bradwell has a well-rounded disease package with good resistance to leaf rust and bunt, and intermediate resistance to FHB. CDC Bradwell is well-adapted across western Canada.

Strengths:

- grain yield 103% of AC® Cardale, over all sites in 2011 to 2012 Coop Registration trials
- grain yield 102% of AC® Carberry in Saskatchewan Regional Variety trials
- superior lodging resistance to AC® Cardale (slightly weaker than AC® Carberry)
- resistant to leaf rust and bunt
- has shown egg laying deterrence to orange wheat blossom midge

To find a SeCan seed retailer near you, visit secan.com.

SeCan

Canada's Seed Partner

For 2017 we're excited to launch three new products for Alberta farmers.

Thunder Seed: One Company, Three Farm Families, Four Generations of Expertise

THUNDER SEED is committed to providing growers top-quality soybean, corn and corn silage seed that delivers high yields and the greatest potential for profit.

Thunder Seed is a collaboration of three families that have been farming for more than four generations. In 1995, the owners of Adams Seed, Petermann Seed and Tobolt Seed combined their passion and resources to found the company. In the years since, they developed an extensive dealer network throughout Western Canada, providing the most genetically advanced soybean, corn and corn silage seed in the industry.

The company's owners are still farmers first. They test new varieties in their own fields and only release seed when the characteristics and genetics are right for growers.

Year after year, Thunder Seed develops and sells top-yielding seed with technological advances, and incorporates genetics and traits that perform well in region-specific soils and conditions. Thunder Seed experts take a consultative approach to helping producers select varieties with the greatest yield potential for their specific operations, and they strive to provide the best customer service in the industry.

From conventional corn to varieties with additional protection, Thunder Seed's selection has the combination of traits needed for growing success. These top-performing varieties have strong yields and are disease resistant, all under low moisture.

Thunder Seed's large selection of soybeans accommodates a variety of soils, and provides disease and pest protection for maximum yields.

Thunder Seed lives its mission to develop and deliver soybean and corn seed that gives growers the greatest potential for high yields and profits year after year, and to deliver unrivaled customer support before, during and after every growing season.

For more information: www.thunderseed.ca; 1-888-6Thunder (888-684-8633); info@thunderseed.com

THUNDER SEED
FIRST in the FIELD

Thunder Seed develops and sells top-yielding seed with technological advances, and incorporates genetics and traits that perform well in region-specific soils and conditions.

Putting Farm Safety **First**

Kent Erickson is at the forefront of the effort to foster a culture of farm safety in Alberta.

FORMED in January, the AgCoalition — short for Alberta Agriculture Farm and Ranch Safety Coalition — is working to ensure a culture of farm safety among Alberta farmers. Formed in part by a common goal to represent the agriculture industry with a single voice as it relates to Bill 6 (the Enhanced Protection for Farm and Ranch Workers Act), this coalition is unprecedented in Alberta history, bringing together cropping and livestock producers who share a common cause.

Serving as co-chair is Kent Erickson, a familiar face to many readers of the Alberta Seed Guide. A fourth generation farmer based in Irma, he and his father farm 4,500 acres of grains and oilseeds including hard red spring wheat, winter wheat, oats, peas, flax, barley and canola. He was chair of the Alberta Wheat Commission until January of this year, and was previously chair of the Alberta Winter Wheat Producers Commission as well.

We recently caught up with Erickson to ask about the importance of AgCoalition, which recently completed a province-wide consultation process that reaffirmed the agriculture community's commitment to ensuring safe farming practices in Alberta.

Alberta Seed Guide: **What did the AgCoalition hear as a result of the recent consultations you hosted across the province?**

Kent Erickson: Farm and ranch safety has always been a focus for our industry. The main thing we heard is that safety efforts should be led by our farmers and farm groups. That will help ensure the application of practical approaches that make sense on the farm. If we can get things led by farmers and producers, that should lead to practical recommendations and a practical approach to safety at the farm and ranch level. We also heard that we need a coordinated approach in order to advance safety in Alberta.

ASG: **Do seed growers face any unique challenges with regard to farm safety?**

KE: We want seed growers to be influencers with their workers and owners. A lot of times the workers are the owners; a lot of the work being done on seed farms is done by the owners themselves. These are the people who know we need a collaborative approach to formulate the rules. So when we have representation from those sectors, there's an understanding that unique operations require a special approach compared to a commercial grain operation, for example.

Kent Erickson is co-chair of the Alberta Agriculture Farm and Ranch Safety Coalition.

ASG: **What major successes has the AgCoalition seen so far?**

KE: Right from our inaugural meeting, we saw representatives from across the industry come together, all wanting to focus on a collaborative approach to enhancing safety. We rarely see such a large unified voice from across the ag sector with such a cohesive message. Another enormous success is working with government to utilize this unified voice, to give support to them through the farmers represented there, and lay the groundwork for a safety strategy. It hasn't been a year yet, and things take a lot of background work to keep this big engine going.

ASG: **What challenges do you see ahead?**

KE: The biggest challenge we see is the fact that Bill 6 covers much more ground than just farm and ranch safety — it has

numerous other components that don't really have much to do with safety. There's a path that the government may be looking to go down where they'd like to see the labour code changed. There's a difference of opinion at the labour table — our industry has a requirement for caring for animals and the environment on a 24-hour basis, and there's no room for a stoppage of work in these sorts of working environments. Animals and plants don't stop work at 5 p.m. and start again at 8 a.m. We have to find ways to manage that in the labour code, and that's something we're going to fight for.

ASG: **How has being co-chair of the AgCoalition changed your personal view of farm safety?**

KE: I truly believe our industry needs and wants to bring the bar up on safety on our farms and ranches. We have an opportunity to make things incrementally better on our farms in a practical way, and we need to do that. Even on my own farm, I think there's things I can do better. We all want to find ways to do it so it's not going to cost enormous amounts of money to bring that level of safety up. We don't want things to cost a pile of money and then realize farm safety hasn't increased.

"Farm and ranch safety has always been a focus for our industry."

—Kent Erickson

ASG: **What's next for the AgCoalition?**

KE: I feel the mandate of all our producer groups is moving forward to build an industry-led process that's sustainable and practical. There are other industry-led organizations that focus on safety in other sectors, and we need to find a way to develop those methods of bringing farm safety up. Our second goal is to start engaging more with the public and trying to reach out to them about real life practical stories, and to tell those stories.

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UBC Research Aims to Help Canadian Flax Farmers

In a recent study, University of British Columbia researcher Michael Deyholos identified the genes responsible for the bane of many Canadian flax farmers' existence: the fibres in the plant's stem.

As part of his research, Deyholos and his former graduate student at the University of Alberta dissected thousands of stems under a microscope in order to identify which genes in the plant's makeup were responsible for the growth of the stem, and which weren't.

Due to the length of the Canadian Prairies' growing season, farmers typically burn the stems, known as flax straw, as opposed to harvesting the material. In many European countries, flax straw is used as an additive in paper, plastics and other advanced materials such as those used in the production of automobiles.

Currently, Canadian flax is used only for the value of its seeds, which can be eaten or broken down into flaxseed oil. Flaxseed oil is used in the manufacturing of paints, linoleum, and as a key element in the manufacturing of packaging materials and plastics.

According to the Flax Council of Canada, Canada is one of the largest flax producers in the world with the nation's Prairie provinces cultivating 816,000 tonnes of the plant in 2014-15 on 1.6 million acres of land.

Wheat Sequencing Consortium Releases Key Resource

Following the January 2016 announcement of the production of a whole genome assembly for bread wheat, the International Wheat Genome Sequencing Consortium (IWGSC), having completed quality control, is now making this breakthrough resource available for researchers via the IWGSC wheat sequence repository at URGI-INRA-Versailles, France.

Wheat breeders and scientists around the world can download and use this invaluable new resource to accelerate crop improvement programs and wheat genomics research. The dataset will facilitate the identification of genes associated with important agricultural traits such as yield increase, stress response, disease resistance and, ultimately, will make possible the production of improved wheat varieties for farmers.

Since the January announcement, the IWGSC project team has been fine-tuning the data so the genome assembly released to the scientific community is of the highest quality possible. The resource — based on Illumina sequencing data assembled with NRGene's DeNovoMAGICTM software — accurately represents more than 90 per cent of the highly complex bread wheat genome, contains over 97 per cent of known genes, and assigns the data to the 21 wheat chromosomes.

New GM Study Analyzes Environmental Impacts

According to new research from University of Virginia economist Federico Ciliberto, widespread adoption of genetically modified crops has decreased the use of insecticides, but increased the use of weed-killing herbicides as weeds become more resistant.

Ciliberto led the largest study of genetically modified crops and pesticide use to date, alongside Edward Perry of Kansas State University, David Hennessy of Michigan State University and GianCarlo Moschini of Iowa State University. The four economists studied annual data from more than 5,000 soybean and 5,000 corn farmers in the United States from 1998 to 2011, far exceeding previous studies that have been limited to one or two years of data.

"The fact that we have 14 years of farm-level data from farmers all over the U.S. makes this study very special," Ciliberto says. "We have repeated observations of the same farmers and can see when they adopted genetically modified seeds and how that changed their use of chemicals."

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