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FALL 2013
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JOHN MCBAIN

AS this is my first message for the ***Alberta Seed Guide***, I thought I'd share a little information about myself. We farm along Highway 22 near Cremona, Alta., growing grains and export timothy. I have been on the board of the Mountain View Seed Cleaning Plant for 14 years and served as president for five years. I've been on the provincial board for three and a half years and was elected president this past January.

With all the good weather this fall, I believe everyone has been enjoying good yields and crop quality with their harvest. With harvest almost over, now is the time to get your samples in for testing for both germination and fusarium. Early testing allows you greater flexibility in booking your cleaning and prevents delays — the labs get extremely busy from January on. It also helps increase the efficiency of our plants by spreading the bookings out a bit. Early testing also gives you more flexibility to source fusarium-free seed if your results are less than ideal.

We'd like to extend our appreciation to our past-president, Steven Miller, for his dedication and work for the industry. He has helped implement many new ideas and initiatives, including strategic planning that has helped us set industry goals for the future.

I hope you enjoy this issue of the ***Alberta Seed Guide***. It gives us a chance to educate ourselves about how gene technology is going to affect our industry. This is a rapidly evolving area of science and public perception and acceptance will have a great impact.

In closing, I hope that everyone can join us Jan. 15 to 17 at the Westin Hotel in Edmonton for our 61st annual general meeting.

John McBain, President
Association of Alberta Co-op Seed Cleaning Plants
Email: john@odysseyfarms.com

DONALD SENDZIAK

WELCOME to the fall edition of the ***Alberta Seed Guide***. It is time to share with you the fruits of our labour and be thankful for the bountiful harvest that everyone is experiencing in Alberta. To all our seed producers, commercial growers and seed industry partners, our main message and theme for this fall issue is "The Gene Network." Along with several crop commissions and commodity groups from across Western Canada, the Alberta Seed Growers' Association led the initiative to investigate and develop a new cereal plant breeding model. Our public breeding sector, under Agriculture and Agri-food Canada, is undergoing immense change with what looks to be a substantial decrease in available funding — questioning the sustainability of cereal breeding in Canada.

We as growers need to step up to the plate and be engaged to show that cereal breeding is of the utmost importance in order for us to be globally competitive. The fact remains that 80 per cent of our entire crop is exported, and we have to suit the needs of our local and global customers. We continue, and encourage all producers, to engage in discussions with our organizations to further the efforts of this initiative to ensure opportune funding investment levels for plant breeding.

It "All Starts with the Seed" and as growers, we know how important it is at this time following harvest to investigate the parameters of your seed to determine its germination, vigour, fusarium graminearum level, smut and other pertinent diseases which will affect the 2014 crop year in your geographic area. It is important to source the best possible seed, and certified seed may certainly play an important role in this. Use various tools when considering new variety options such as Alberta Regional Variety Trials (to be published this January in our spring edition of the ***Alberta Seed Guide***) and side-by-side crop trials. As well, consult your local seed grower who has already been multiplying the seed for several years.

With the various pertinent topics in this fall issue, we hope this will inform everyone as to what may impact and benefit us in the future. Thank you!

Donald Sendziak, President
Alberta Seed Growers' Association
Email: sendseed@telusplanet.net

MINISTER OLSON

AS Minister of Agriculture and Rural Development, I am pleased to extend greetings to readers of the fall issue of the 2013 ***Alberta Seed Guide***. Once again, the Alberta Seed Industry Partnership has done a great job putting together a resource that provides a wealth of information and examines important issues facing our agriculture industry.

In today's competitive global economy, innovation is pivotal to our ongoing success. Our agriculture sector must continue to adapt and evolve, so that it is well positioned to take advantage of new market opportunities. The theme of this edition of the seed guide, The Gene Network, reminds us just how far our understanding of seed genetics and varietal development has advanced over the years.

Your government is committed to building Alberta and supporting a vibrant and sustainable agriculture industry. Through initiatives such as Growing Forward 2, we are investing more than $400 million in research, technology, environmental stewardship, best farming practices and business development that will help take agriculture to the next level.

As Alberta and Canada expand our reach into the global marketplace, there are tremendous opportunities for our producers to help feed a world population that is expected to reach nine billion by 2050. The strength and commitment to quality within our seed industry will be an important factor in securing our place as a preferred and reliable supplier of food.

Best wishes for continued success to our producers.

Verlyn Olson, QC
Minister of Agriculture and Rural Development

SHAWN BROOK

WHY should we be so proud to farm in Alberta?

I travel around the world working in the global seed industry and I can tell you that the level of commitment, technology and expertise in this province is quite literally second to none. The ability of Alberta growers to respond to market trends, varietal requirements and consumer needs is impressive to the rest of the world. However, we cannot become complacent, and we must stay diligently focused on the core competencies that have made this province a leading agricultural producer.

We have many other competitors chasing us, and they want to "eat our lunch." To stay ahead of that, we must keep learning — and that means investing time and resources to make sure that not only do you have opportunities to learn, but so does your entire team right from your spouse to your son to your hired hand.

Among the great opportunities for learning is to attend one of the many well-planned events in your area this winter. Or if you are really ambitious, consider reaching out to your local school and offer to share some insights with the students or teachers. It's been my experience that some of our best learning can come from our attempts to teach.

Our position of leadership has taken some knocks in the last number of years, but I think that we are gathering steam to push forward. What are you going to do this winter to become better at your job?

Shawn Brook, Publisher
Alberta Seed Guide | Email: sbrook@issuesink.com

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Alberta Seed Guide

Fall 2013

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lorena.pahl, general manager
Alberta Seed Industry Partnership
5030-50 st.
Lacombe, AB T4L 1W8
Ph: (403) 782-8022
Fax: (403) 782-5514
Email: lorena.pahl@seed.ab.ca

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PUBLISHER
shawn.brook

EDITORIAL
kari.belanger, **jennifer**.golletz, **lindsay**.hoffman, **julie**.mcnabb, **shannon**.schindle

CONTRIBUTORS
melanie.epp, **angela**.lovell, **susan**.peters, **rosalie**.tennison

DESIGN
wade.clisby, **jeff**.hiebert, **lesley**.nakonechny

MARKETING
craig.armstrong, **adria**.grewal, **hiten**.shah, **sam.**mostafa

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FEATURES

ON THE COVER: Comparison of wheat samples with DNA markers labelled with fluorescent dyes (blue, green, yellow and red). USDA molecular geneticist Shiaoman Chao and her team used this analysis method to identify simple sequence repeat markers for determining the genetic diversity of wheat. SSRs are segments of a genome (genetic sequence), composed of tandem repeats of a short sequence of nucleotides, usually two to six base pairs. Identification of SSRs is often used in breeding in order to select for, or against, certain genetic traits. Photo courtesy of Shiaoman Chao, United States Department of Agriculture.

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NEXT GENERATION GENETICS

Researchers are discovering new genes to increase tolerance to disease and environmental stress.

DISEASE AND ENVIRONMENTAL stress were present in abundance last year, thanks to some extreme weather conditions in the United States and Canada. The U.S. Midwest experienced record-breaking temperatures and serious drought, while it was the third wettest and fifth warmest spring in 65 years across the Canadian Prairies, followed by one of the 10 hottest summers on record.

Heat and humidity increased the incidence of disease, causing an unusually high number of aster yellows outbreaks in canola and cereals, blackleg and clubroot in canola, and severe fusarium head blight outbreaks in cereals.

It's hardly surprising that there is a renewed focus on efforts to provide farmers with tools to combat the disease and environmental stresses that are affecting their crops.

Benefits of Wild Relatives

While genomics has accelerated the process of identifying individual genes and evaluating them for the attributes they confer on plants, conventional breeding is also advancing the development of varieties with specific traits such as disease resistance and stress tolerance. Researchers are increasingly turning to the wild relatives of plants for answers to these complex issues.

"You might be able to identify genes in wild relatives that can be integrated into the crop, or using a biotech approach, inserting genes that would be helpful," says Wilf Keller, president and CEO of Ag West Bio Inc. in Saskatoon. "For example, rye has more tolerance to frost and cold than wheat does, and it's possible to cross wheat and rye, so we may ultimately be able to move genes from rye to wheat."

There are several seed companies that are at the forefront of developing stress tolerant crops, especially in corn, where drought tolerant varieties are widely available. However, researchers have come to realize that they need to expand their search beyond the obvious to build robust resistance or tolerance into new varieties.

It's often a combination of genes, not just related to abiotic stresses like drought, heat or cold, which interact with each other to confer stress tolerance. Ravindra Chibbar, Canada research chair at the University of Saskatchewan, has been studying low temperature tolerance and winter survival in winter wheat. Chibbar and his team sequenced a chromosome region of a very cold hardy winter wheat, cultivar Norstar, and identified transcription

factors, or regulatory genes, which can induce changes in other genes. From there, they identified and characterized a handful of genes responsible for enhanced cold hardiness in winter wheat.

The research, however, also uncovered a relationship with other developmental traits, such as growth habit and final leaf number, which also contribute to a plant's cold tolerance. "The contribution of the developmental traits is a major advancement from our work that has come by identifying wheat chromosomal regions contributing to cold tolerance," says Chibbar.

Environmental stress varies according to geography and season, adding complexity to the task of incorporating traits that help producers cope with unpredictable weather. "We are selecting for germplasm that performs well across a lot of environments and will offer some tolerance to those high stress environments," says Chris Anderson, canola breeding lead for Monsanto Company.

"Doubled haploid production shaves years off [the breeding process], and if you can use greenhouse and contra season production as well, you can save three or four years quite quickly."

– Todd Hyra

Driving Disease Research

Over the past couple of decades, producers have come to rely on varieties with resistance to various diseases, but increasingly the single genes conferring resistance are starting to show signs of being overtaken by pathogens that have adapted to this type of resistance. In addition, agricultural practices such as short rotations and, in some cases, an over-reliance on fungicides, are driving researchers to seek out multiple sources of resistance.

"We are focused not just on delivering disease resistance today, but also on finding new resistance genes and bringing them into elite germplasm," says Anderson. "We are spending a lot of effort [to determine] how to bring those genes together to create more robust tolerance—tolerance that should stand up in the environment longer."

Much of the current public research is focused on gaining a deeper understanding of the pathogens and their variability. Key steps in that process are characterizing, at the molecular level, the different types of resistance that are present and determining how pathogens adapt to resistance across larger geographies.

One such research project is being led by Kelly Turkington, a research scientist at Agriculture and Agri-Food Canada's Lacombe Research Centre, and also involves researchers from the University of Alberta, Alberta Agriculture, and AAFC scientists from Manitoba and Saskatchewan. The project is assessing variability in the net blotch pathogen in relation to mating type, sexual reproduction, host resistance and sensitivity to fungicides. "We wanted to look at the pathogen in the sense of how variable it was across the Prairie region," says Turkington, "and that has implications for how rapidly it could potentially adapt to sources of resistance that are deployed by breeders."

Speeding Up the Process

Both public and private breeding programs are constantly seeking ways to deliver disease and stress resistant varieties more quickly to producers.

Contra season production, where seed is multiplied during the winter in the southern United States or elsewhere, such as in Southern Hemisphere nations, is common in higher value, lower volume crops such as canola and corn, but isn't as easy to do with cereals. "In cereals, it has to be done quite cautiously," says Todd Hyra, Western Canada business manager for SeCan. "You have to really pick your spot because you have to do those [crops] at the beginning of multiplication, rather than at the end because the volumes get so large, so fast. You really need to be producing those final years of multiplication in Canada in order to make the economics work."

Doubled haploid production is another important technology that is being used to speed up the development of new varieties. Traditional techniques generally require multiple generations of selection to stabilize desired traits in breeding lines, which eventually become new varieties. Doubled haploids, on the other hand, are genetically pure inbred plants. Through the use of biotechnology, these plants are produced in a single year, enabling breeders to stabilize desired traits in just one generation. "Doubled haploid production shaves years off [the breeding process], and if you can use greenhouse and contra season production as well, you can save three or four years quite quickly," says Hyra.

Rising Interest

Epigenetics is a scientific discipline that has been around for some time, but thanks to related high-profile research into human health, it is gaining more attention in plant research circles. A team led by scientists Jeannie Gilbert and Steve Haber at AAFC's Cereals Research Centre in Winnipeg has been exploring the potential of epigenetics to deliver adapted, high-quality spring wheat germplasm, which combines new resistance to some pathogens while maintaining existing resistance to others.

"The starting materials for our work are contemporary, high-quality wheat cultivars that are well adapted to Western Canada," says Haber. "They are resistant to predominant races of leaf and stem rust, but fully susceptible to wheat streak mosaic virus and range in responses to fusarium head blight from highly susceptible to, at best, moderately resistant."

In other words, epigenetics affects the expression of the information coded in the genes of plants and other living organisms. These heritable changes in gene expression in the plant are achieved without changing the coding information in the DNA, and do not involve the insertion of outside or exotic genes.

"Our protocols evolve, among the direct descendants of these cultivars, lines with near-immunity to WSMV, and with repeated selection, lines with improved resistance to FHB and leafspot diseases," says Haber.

Many Hands, Light Work

Private companies have had much success delivering new varieties possessing agronomic advantages such as increased yield and traits, which provide a good return on investment as well as value for producers. The public sector has also conducted research into plant diseases for many years, resulting in a large reservoir of knowledge and expertise within public laboratories and universities.

Increasingly, these areas of expertise are being brought together as domestic and international partnerships and collaborations between private, public and non-profit entities. "Disease [research] is a very good area for public-private partnerships," says Keller. "I think we are seeing more of it, and I think we will see even more because it makes very good sense for these two different groups to work with each other."

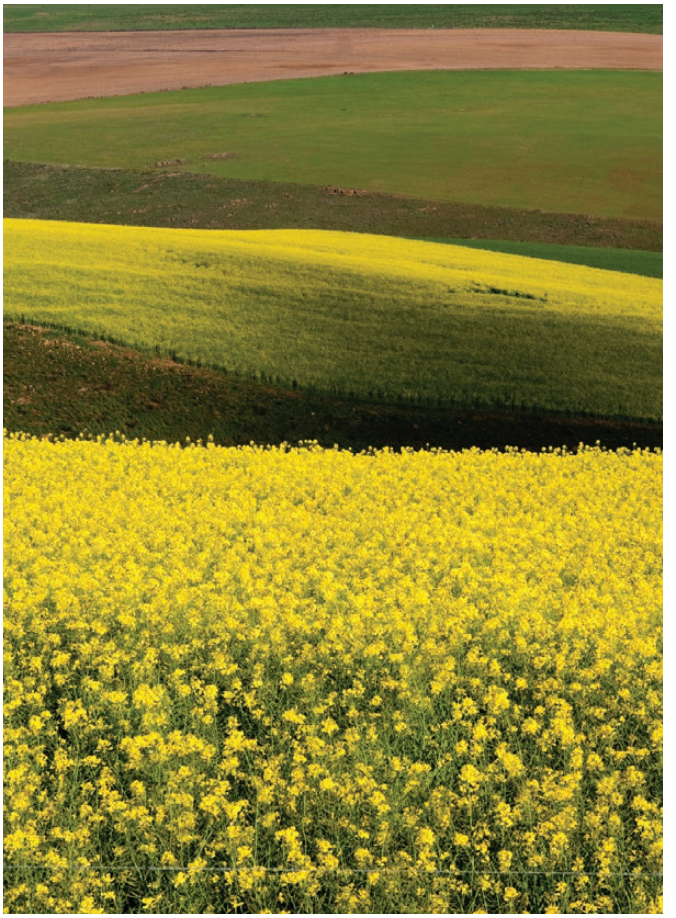
Large-scale screening for resistance is becoming more common and involves collaborations between international breeding facilities, which share information and germplasm.

A research program into net blotch in cereals involves researchers from Canada and Australia, who are testing the reaction of Australian barley lines to Canadian isolates of the pathogen. A nursery in Njoro, Kenya, is providing field screening for stem rust (Ug99 races) and stripe rust races for programs evaluating rust diseases in cereals, and by using winter nurseries in New Zealand, researchers are able to select for fusarium resistance and leaf and stripe rust resistance while advancing generations. Chibbar's team in Saskatchewan will use northern European and/or Russian wheat lines to seek out new sources of cold tolerance that could be bred into Canadian winter wheat cultivars. And a cooperative research plan between China and Canada for blackleg risk mitigation is collating and sharing data and results from research projects in the two countries.

Private companies are also increasingly involved in global collaborations. For example, Monsanto currently collaborates with Australian and European researchers on canola disease studies such as those on blackleg. "We have a sister breeding group in Europe and it's a tremendous opportunity to share information and germplasm back and forth to utilize the best tools that we can," says Anderson.

On the Horizon

The Western Grains Research Foundation recently announced $3.5 million in new funding for 25 crop-related research projects through a co-funding partnership with the Agriculture Development Fund and producer commodity groups. The WGRF's endowment fund supports research on a broad range of crops and has a number of key priority areas, including crop risk management.



Funding from AAFC is helping drive research for clubroot and blackleg resistant canola varieties.

Projects receiving funding include mapping of blackleg in canola, fusarium resistance in cereals, new technologies to assess sprouting damage in wheat, building durable clubroot resistance in canola, pulse disease management and improving weed management for growers.

Canola

The canola industry has a stated goal of reaching 15 million tonnes of sustainable production by 2015. A big step towards that goal was the $15-million investment announced by the federal government in July towards canola research under the Growing Forward 2. This funding, combined with industry contributions, provides more than $20 million over five years for projects under a new collaborative Canola Cluster involving a number of research institutions across Canada, including AAFC research stations, universities, and other public research facilities. Projects are focused around clear, strategic themes: oil nutrition, canola meal nutrition, canola health and integrated pest management, canola yield and quality optimization, integrated crop management and sustainability of canola production, canola supply surveillance and forecasting, and science cluster tech transfer.

In a year when it was confirmed that clubroot has spread across all three Prairie provinces, clubroot resistant varieties remain the only truly effective control against the disease.

The leading research on developing new sources of clubroot resistance was funded by the Clubroot Risk Mitigation Initiative

"Disease [research] is a very good area for public-private partnerships … I think we are seeing more of it, and I think we will see even more because it makes very good sense for these two different groups to work with each other."

– Wilf Keller

through Growing Forward 1. Genyi Li at the University of Manitoba, Habbibur Rahman at the University of Alberta and AAFC's Saskatoon Research Centre have identified and developed new sources of clubroot resistance, which should soon be available for breeders.

Resistance to blackleg is already weakening under certain conditions, and new races of the pathogen that have potentially adapted to resistant canola cultivars are cause for concern. Researchers are trying to develop a strategy to mitigate the impact of pathogen population change; for example, Dilantha Fernando from the University of Manitoba and Gary Peng from AAFC's Saskatoon Research Centre are monitoring blackleg pathogen races present on the Prairies. The researchers are analyzing the resistance genes available in commercial varieties in order to make recommendations to growers about how to rotate different resistant varieties more effectively. The research is supported by the Canola Agronomic Research Program, which receives funds from canola growers' associations in Alberta, Manitoba and Saskatchewan as well as the Canola Council of Canada.

There are few genetic sources of true sclerotinia resistance available to plant breeders, making the development of sclerotinia tolerant varieties challenging. Projects include work led by Lone Buchwaldt at AAFC. She is collaborating with colleagues at the Saskatoon Research Centre on mapping the quantitative resistance loci in *Brassica napus* germplasm from Asia and Europe. They are also examining the contribution of individual defense genes in more detail. Preliminary data on the pathogen itself has revealed it is genetically diverse across the three Prairie provinces and isolates vary in the level of aggressiveness on canola.

Cereals

Rusts remain a major focus of cereal research programs. Many studies are large in scope, involving researchers from across Canada as well as internationally, as is the case with Ug99 research.

Stephen Fox, a wheat breeder at Winnipeg's AAFC Cereal Research Centre, is screening material for resistance to stem, leaf and stripe rust resistance, and is close to registration of a new variety that may offer some resistance to the Ug99 group of stem rust races. Curtis Pozniak at the Crop Development Centre at the University of Saskatchewan is also involved in rust resistance research, and is completing an inventory of advanced genetic plant material from work initiated by the late Douglas Knott, which will be made widely available to breeders and pathologists.

In the case of leaf rust, varieties have relied heavily on a single gene, Lr21, for many years—to the point where it has become highly leveraged in many areas of the United States and Canada. Canadian researchers are adding other genes to diversify the basis of leaf rust resistance in spring wheat.

Fox's team is also characterizing resistance genes in fusarium, which will hopefully lead to the development of better molecular markers to more easily identify and retain sources of resistance.

In the area of barley research, as part of its five-year AgriInnovation Program, the federal government recently announced an $8-million investment in a national Barley Research Cluster that will fund 28 projects at research facilities and universities across Canada. The cluster is a private-public collaboration that is also funded by the Alberta Barley Commission, which will administer the program, the Western Grains Research Foundation, Rahr Malting and the Brewing & Malting Barley Research Institute. Its focus will be on four main areas of barley research; breeding and genetics, agronomy, pathology and creating value-added opportunities for barley.

Soybeans and Corn

Although soybeans and corn are relatively new crops to Western Canada, there is growing interest among producers in varieties that can perform well in shorter growing seasons. As a result, retail seed companies are selecting new corn varieties that offer early silking and early pollination.

In June, Monsanto announced it would invest $100 million during the next 10 years in its Canada Corn Expansion Project. The project aims to breed corn hybrids that can be widely grown across 26 million acres in the West. The company estimates this could boost the annual western Canadian corn market, currently sitting at 500,000 acres, to 10 million acres by 2025.

Syngenta plans to release two new corn varieties in Canada. Agrisure Duracade 5122 and Agrisure Duracade 5222 will be available for the 2014 season and offer stacked traits against corn rootworm. Both will contain Syngenta's Agrisure RW trait stacked with its new Duracade trait.

In addition, two major trait development companies plan to roll out new soybean varieties over the next two years. DuPont Pioneer, through technology licensing agreements with Monsanto, will offer Genuity Roundup Ready 2 Yield soybeans in 2014, and Genuity Roundup Ready 2 Xtend glyphosate and dicamba tolerant soybeans in 2015, pending regulatory approvals. **Angela Lovell**

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biotech buzz

From increased acceptance of new technologies around the world to lingering consumer concerns on GM to the opportunities that exist for Alberta farmers — three industry experts weigh in on the chief issues surrounding biotechnology today.

biographies

Based in Washington, D.C., **Cathleen Enright** is the executive vice-president of the food and agriculture section in the Biotechnology Industry Organization, where she is responsible for industry leadership and advocacy on legislative, regulatory and market access issues. Before joining BIO, Enright led the federal government affairs office of the Western Growers produce association, working on issues as varied as immigration reform, tax law and the farm bill. Prior to this, she spent 12 years in the federal government negotiating agricultural trade agreements, most recently as deputy assistant U.S. trade representative. Enright began her government career at the U.S. Department of State, where she negotiated the Cartagena Protocol on Biosafety and the international access agreement on plant genetic resources for food and agriculture. She earned a doctorate in biochemistry from the State University of New York and completed her post-doctoral training at the Johns Hopkins University School of Medicine.

Peter Entz manages the seed and trait business for Richardson International. In his role, Entz positions seed products for Richardson Pioneer that are ultimately grown by its farm customers. The focus is on all major crops, with a particular interest in canola, due to Richardson Oilseed processing business, and more recently cereal seed. Richardson is an integrated company, so seed opportunities are most often driven by the grain or demand side of the business. The balance is having the right seed portfolio that farmers want to grow and buyers want to buy. Entz is very involved in the Canadian seed industry, and is president of the Canadian Seed Trade Association for 2013-2014.

Stan Blade is CEO of Alberta Innovates Bio Solutions. AI Bio is a provincial corporation that leads and co-ordinates science and innovation to grow prosperity in Alberta's agriculture, food and forestry sectors. Blade is an adjunct professor in the Faculty of Agriculture, Life and Environmental Sciences at the University of Alberta. He is vice-chair on the board of trustees of the African Agricultural Technology Foundation, a Nairobi-based agency supported by the Bill and Melinda Gates Foundation. In 2013, Blade was appointed by the Government of Canada to the council overseeing the Canada International Food Security Research Fund. Blade has also worked in West Africa (as a plant breeder and deputy director general) for the International Institute of Tropical Agriculture. Blade was raised on a dairy farm near Millet, Alta. He has served on the University of Alberta Senate and on the boards of Telus World of Science and Edmonton Public Library. In 2012, Blade was named by Alberta Venture as one of "Alberta's 50 Most Influential People." Blade has worked and traveled in 80-plus countries.

***ASG*: What will biotech acceptance look like in five years?**

CE: Since commercialization of the first biotech crop almost 20 years ago, farmers in the developed world have been the primary drivers of acceptance; however, in the last few years, adoption of the technology outside the industrialized world has begun to outpace that of developed countries. In 2012 — for the first time — more acreage was planted to biotech crops by developing countries (52 per cent). Global acceptance continues to grow at a rate of approximately seven per cent annually.

While millions of farmers around the world (more than 17 million in 28 countries) have chosen to plant biotech crops, public acceptance lags behind, as most of the biotech crops produced today (primarily corn, cotton, soybeans, sugar beets, alfalfa and canola) were designed to provide farmers with better tools to combat pests and diseases and to control weeds. What the consumer does not see is the societal benefit of planting biotech crops: the reduced environmental impact, land conservation, cleaner water and air, and lower food costs. According to the Grocery Manufacturers Association, the dependable, high-quality yields produced with biotechnology help reduce the price of crops used for food by as much as 15 to 30 per cent.

I believe agronomics traits will continue to represent the majority of biotech crops through the next five years, as farmers are calling on biotechnology companies to provide them with more choice regarding pest and weed management, including through multiple modes of action. In addition, crops that can better withstand drought will become more widely available.

By 2018, however, we should begin to see new types of products with direct consumer and food service benefits such as the non-browning apple and the non-browning, low-acrylamide potato. Interestingly, soybeans with a fatty acid composition that resembles olive oil are approved in the United States today, but are not being commercialized on a large scale until regulatory approval is also received from the EU, so as not to introduce global disruptions in soybean trade.

The availability of more and more biotech foods with clear benefits to the consumer may help to positively impact acceptance, but we are not waiting. We are joining the conversation. In July of this year, six large plant biotechnology companies launched an initiative, "GMO Answers" (gmoanswers.com), to help consumers find the information they are seeking about agricultural biotechnology. We want consumers to be able to find information about GMOs all in one place, so they can make up their minds with facts in hand.

PE: There are a number of camps to consider when you look at biotech acceptance — the farmer, the regulator and the consumer. How will that play out in the next five years? As farmers continue to evaluate their crop production system, they will continue to look for biotech solutions that make sense for their operation. Canadian farmers have the highest adoption rates for biotech in the world, particularly with crops such as canola, corn and soybeans.

From a Canadian perspective, my view is the general farm population supports new technology and innovations brought forward through biotech — again, as long as it plugs in and makes sense for their operation. In Canada we have a regulatory body that supports the science of biotech, and I see that group continuing to evaluate and support biotech on its scientific and practical merit. Consumers want healthy, nutritious food at a reasonable cost. Canadian consumers are interested in learning more about biotech and we are confident that they will be very supportive of the technology with all the benefits it drives.

"As farmers continue to evaluate their crop production system, they will continue to look for biotech solutions that make sense for their operation."

– Peter Entz

SB: I think many tools of molecular biology will be commonplace in cultivar development — marker-assisted selection, high throughput screening and genomic analysis which identifies interesting new traits. Transgenic crop products will start to be seen as the solution to the looming global food security issue, including in the developing world. I have seen the interest African scientists have in using biotech tools within my work as a trustee of the African Agricultural Technology Foundation.

***ASG:* What will biotech acceptance look like in 10 years?**

CE: Genetically engineered wheat may be available to farmers with a host of agronomic traits to choose from. With the U.S. wheat industry fully aware that wheat acreage has shrunk by 18 per cent over the last 16 years (as farmers switched to more biotech corn and biotech soy because of reduced input costs), there is a lot of interest in developing biotech wheat. With most wheat being consumed directly by people, wheat farmers are wisely working now on ways to prepare consumers.

The availability of biotech wheat worldwide will have a significant impact on acceptance, particularly in developing countries where wheat plays a large role in their farmers' livelihoods and in their national economies.

Additional traits conferring resilience to extreme weather, such as flooding (rice), and tolerance to saltier soils (wheat), may also be right around the corner. Frost-tolerant eucalyptus trees may provide the forestry sector with a fasting growing tree that can thrive in the Northern Hemisphere.

I am hopeful that the next decade also sees the introduction of micronutrient fortification in biotech crops. A number of these (for example, rice fortified with B-carotene and beans enhanced with iron and zinc) have been in development for years. The introduction of "Golden Rice," which was developed to help prevent blindness in more than five million children each year, has been stymied for a decade because of pressure from opposition groups.

Characteristics such as those above which consumers can readily appreciate and value would be expected to have a positive impact on acceptance. In addition, current public-private sector partnerships such as the New Alliance for Food Security and Nutrition, aimed at helping alleviate poverty in sub-Saharan Africa over the next 10 years by supporting agricultural development, should also move the needle.

PE: In the next 10 years there will likely be some breakthroughs in the science of biotechnology, which will translate to additional agronomically-beneficial traits being introduced in a broader range of crops. Marker assisted breeding, RNA interference and rDNA methodologies will tend to merge into a whole suite of genetic improvements. One would also expect to see traits with direct benefits to consumers, for example peanuts absent the peanut allergens, enhanced vitamins, etc. All these developments will assist in changing the conversation from "GMOs" and transgenic plants and their negative perceptions, to potentially a more accepting viewpoint.

SB: We will see a continuation of biotech acceptance with more tools, such as genome editing, which will provide opportunities to address many desirable traits such as water and nutrient use, as well as many traits desired by citizens. I think the word consumer will eventually fall into disuse. Citizens want to be engaged in what they use; they don't want to be seen as only acting as ravenous consumers.

***ASG:* What opportunities in seed will increased biotech acceptance bring to farmers in Alberta?**

CE: Considering EU attitudes on biotechnology, the biggest opportunities for growth among developed countries are likely to occur in the United States (currently the lead producer of biotech crops globally) and Canada (the fourth largest national producer of biotech crops with 11.6 million hectares, the majority of these being 8.4 million hectares of biotech canola at a record adoption rate of 97.5 per cent).

Clearly, Canada is already a major supplier of canola, but future traits will allow for higher oil content and improved oil profiles.

Canada and the United States are two of the world's largest — but not the largest — suppliers of wheat. When biotech wheat becomes available, this could cause a tremendous shift in wheat production as higher yielding traits become available for farmers.

PE: We are really at the tip of the iceberg, especially in Western Canada. So far we have used the tools of biotechnology primarily to manage weeds — managing weeds in crops where weed management was poor and/or costly. On one hand it was a really big deal, but one can only think there is much more that can be done. Dealing with diseases like fusarium head blight would be a great tool for farmers. Managing those significant abiotic stresses that reduce yield almost every year would [be one tool]. Somehow creating the ability of certain species to fix nitrogen would be intriguing. Ultimately, all I can say is that we likely only see the tip of the iceberg.

"When biotech wheat becomes available, this could cause a tremendous shift in wheat production as higher yielding traits become available for farmers."

– Cathleen Enright

SB: Cultivar switching will happen faster, as new traits — and higher yields — will create a business case for producers to invest in newer and better genetics.

***ASG:* What challenges in seed will increased biotech acceptance bring to farmers in Alberta?**

CE: The single biggest challenge facing our global agriculture sector right now is providing for the world's growing population. Meeting this challenge will require farmers to produce more food than ever before on less land. Science and technology — including biotech innovation — will be a critical part of the solution. The demand for biotech seed will increase proportionately and international trade will play a vital role in moving commodities from regions of the world with a surplus production to regions of the world that do not have the ability to be self-sufficient in grain production.

As such, the global regulatory system for approving biotech crops may provide seed developers and producers with their greatest challenge. The timing of regulatory approvals among major trading partners is not in synch. Between some countries there can be a three-year gap or more between approvals of some biotech crops. For grains and fibres that are aggregated prior to export, this brings the threat of potential trade disruptions. The growing importance of trade will require greater focus on improving global regulatory predictability and timeliness, and will require countries around the world to find ways reduce the threat of unnecessary trade disruption.

PE: There are two challenges that spring to mind instantly. The cost of developing and introducing technology is expensive today and will likely only increase going forward. The challenge will be to ensure that value is being derived for both the farmer and/or consumer. Secondly, the influence on those who would impose non-science based regulations is perhaps the bigger challenge.

SB: We will need to work with our customers to ensure that we deliver what they want. There will be more contract production of specific-trait products — starch, oil and/or protein — and we will have to ensure our identity-preserved systems can deal with large numbers of these products. **Julie McNabb**

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Treated Seed Stewardship

In the face of increasing scrutiny over the relationship between neonicotinoids and honey bee health, industry stakeholders are taking action to develop new products and best management practices for treated seed usage to further reduce risks to bees and other pollinators.

THE TREATED SEED market has been red-hot in recent years, with innovations in treatment types, active ingredients and new application technologies, leading to increased adoption by more farmers and for a growing array of crops. But as the use of treated seed has grown in North America, Europe and around the world, so has speculation about the possible impact of dust from insecticide-treated seed on the environment — particularly honey bees and other pollinators.

A series of scientific studies over the past few years has increasingly tried to link neonicotinoids — the chemical group of systemic insecticides that includes clothianidin, imidacloprid and thiamethoxam — found in some seed treatment products to negative effects on bee health. This has increased pressure on government regulators to step in and impose new rules on seed treatment handling and usage — or in some instances, restrict some uses of neonicotinoid pesticides altogether.

A controversial restriction by the European Commission on neonicotinoid products — including treated seed — goes into effect across Europe on Dec. 1. Intended to help prop up diminishing honey bee populations in Europe, the move comes after many months of impassioned political debate within European Union nations and the European Commission over the efficacy of the two-year restriction.

"The European Commission's decision is a setback for European agriculture," says Martin Gruss, global head of SeedGrowth products for Bayer CropScience, a major player in the seed treatment industry. "Restricting the use of imidacloprid and clothianidin in crops such as maize, oilseed rape, cotton and sunflowers will put at risk farmers' ability to tackle the destructive pests that can severely damage crops and restrict their capability to grow abundant, high-quality, affordable food in Europe."

Gruss condemned the EC for choosing to ignore the long track record of the safe use of neonicotinoids as well as significant stewardship improvements for seed treatment that have been implemented in recent years. He says Bayer CropScience remains convinced that neonicotinoids are safe for bees when used responsibly and correctly according to the label instructions. "Current scientific evidence has overwhelmingly concluded that the increased mortality of bees, as has been observed in some parts of the world, is largely due to a complex set of factors," Gruss says, citing the Varroa mite and habitat loss as two key issues affecting bee health.

Neonicotinoids Under Scrutiny in Canada

The same class of neonicotinoids restricted in Europe are also under review in this country. Health Canada's Pest Management Review Agency recently announced it was expediting a re-evaluation of all uses of neonicotinoid insecticides. The review was initiated earlier this year following reports of bee deaths in Ontario and Quebec during the 2012 corn planting season.

The PMRA issued a Notice of Intent document entitled Action to Protect Bees from Exposure to Neonicotinoid Pesticides on Sept. 13. In it, the agency notes it received "a significant number of pollinator mortality reports [in spring 2013] from both corn and soybean growing regions of Ontario and Quebec, as well as Manitoba. Consequently, we have concluded that current agricultural practices related to the use of neonicotinoid-treated corn and soybean seed are not sustainable."

www.hc-sc.gc.ca/cps-spc/pest/part/consultations/_noi2013-01/noi2013-01-eng.php.

As a result, the PMRA plans to establish a number of bee protection protocols for the 2014 corn and soybean planting seasons. They include:

- Requiring the use of safer dust-reducing seed flow lubricants
- Safer seed planting practices
- New pesticide and seed package labels with enhanced warnings
- Requiring information to justify the continued use of neonicotinoid treatment on corn and soybean seeds

The PMRA is encouraging interested parties to submit comments in writing to pmra.publications@hc-sc.gc.ca by Dec. 12.

According to the PMRA statement, the agency is working with Agriculture and Agri-Food Canada, provincial authorities, growers, beekeepers and the crop protection industry to determine if "other options exist" that would protect the environment while allowing the continued use of neonicotinoid-treated seed for corn and soybean production.

"Bee health is a complex issue that goes beyond the incidents in 2012 and 2013 and may involve a number of additional factors, including parasites, disease and climate."

– Pest Management Regulatory Agency

"Bee health is a complex issue that goes beyond the incidents in 2012 and 2013 and may involve a number of additional factors, including parasites, disease and climate," the PMRA states, adding that the neonicotinoid re-evaluation is being done in co-operation with the United States Environmental Protection Agency as part of its work with international partners to "better understand and manage potential risks these pesticides may pose to long-term bee health."

The PMRA further maintains that it "applies a science-based approach to regulate pesticides. We continue to review new

Photo courtesy of Bayer CropScience.

Bayer CropScience has opened 10 Bayer SeedGrowth Centers globally to offer customer training.

Photo courtesy of Bayer CropScience.

There is a growing commitment from the industry to supply high-quality treated seed.

scientific information as it becomes available and we will take additional action as needed, at any time, to further protect health and the environment."

Sara Lauer, media relations officer for Health Canada, says her department has been working closely with growers, beekeepers, seed treatment facilities and seeding equipment manufacturers to develop both short- and long-term strategies for protecting pollinators, including honey bees.

Lauer points to a growing number of industry-led initiatives in Canada aimed at protecting pollinators. "Longer-term strategies such as improved seed coatings, lubricants and seeding equipment continue to be developed by stakeholders," she says.

Following the publication of the PMRA document, Bayer CropScience released details of a new seed application lubricant, which it described as a fluency agent, made from polyethylene wax. In its release, Bayer said lab and field trials for the new product indicate it can dramatically reduce the amount of dust emitted from planters.

Lab tests showed a 90 per cent reduction in total dust emissions compared to talc lubricants and 60 per cent relative to graphite lubricants. Bayer said large-scale field tests conducted on 40,000 acres in North America this spring were similarly positive.

"We were impressed by the success of this new fluency agent when we examined the field trial results," said Paul Thiel, Bayer CropScience vice-president of innovation and public affairs, in the release.

BMPs for seed-applied insecticides can be found at croplife.ca/issues/pollinators.

Pollinator Protection and Responsible Use of Treated Seed: Best Management Practices can be found at http://goo.gl/FXNtU

Lab tests showed a 90 per cent reduction in total dust emissions compared to talc lubricants and 60 per cent relative to graphite lubricants.

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"Although potential exposure from corn planting is relatively rare, co-operation among applicators, growers and beekeepers is a critical part of effective best management practices for seed treatment applications and important for pollinator health."

Best Management Practices for Using Treated Seed

A prime example of this co-operation is a set of BMPs for usage of seed-applied insecticides that CropLife Canada developed in co-operation with growers, beekeepers and provincial government agricultural agencies. The guidelines were posted on CropLife Canada's website earlier this year, and include a video on the topic.

Pierre Petelle, vice-president of chemistry with CropLife Canada, says another project is underway to develop safe handling protocols and recommendations for commercial seed treatment facilities. "Those will be finalized over the next year and brought into force in 2015," he says.

Petelle believes these types of industry-led stewardship initiatives make neonicotinoid restrictions like those imposed in Europe less likely to happen in Canada.

"We think that industry taking initiative and demonstrating that it can regulate in these areas on its own certainly does avoid some of the interventions from governments," he says. "In our opinion, the European decision wasn't grounded in science — it was a political outcome. … We are fully confident that [the PMRA and EPA] will continue to support a science-based approach, and the science does support the safety of these products."

For its part, Health Canada released its own growers guide for the safe handling of neonicotinoid-treated seed, entitled *Pollinator Protection and Responsible Use of Treated Seed: Best Management Practices*, back in April. According to Lauer, the BMPs were developed "in consultation with a wide variety of stakeholders to ensure that the recommended practices were as practical and effective as possible and would be well received."

Mark Halsall

Best Management Practices

Here's a rundown of Health Canada's treated seed BMPs:

Know where beehives are located
Communication and co-operation among growers, seeders and beekeepers on the timing of seeding and the location of hives can help reduce the risk of bee incidents. Important information such as whether hives are located upwind of the planting area can be shared with growers, and it also enables beekeepers to take measures to temporarily protect or relocate hives when feasible.

Monitor weather conditions
The weather can influence pollinator exposure to treated seed dust, which can be carried in the air or deposited onto flowering crops, weeds, soil or water sources. It is important to monitor environmental conditions and avoid planting treated seed in windy and/or very dry conditions. Also, consider wind direction and avoid planting treated seed if bees are foraging downwind or nearby.

Avoid generating dust when handling treated seed
Check for quality when handling and loading treated seed — seeds should be clean and the coating should be well adhered to the seeds. Handle bags with care during transport, loading and unloading in order to reduce abrasion, dust generation and spillage. Pour seeds carefully into the planter to avoid dust, and do not shake any loose material or dust from the bag into the planting equipment. And make sure not to load or clean planting equipment near bee colonies, flowering crops or weeds, or hedges.

Maintain planting equipment
It is important to use planting equipment that minimizes spillage and dust emission from the planter. When appropriate, consider using deflector equipment, which can reduce dust emissions as well as off-field deposits of dust. Always follow the directions provided from planting equipment manufacturers and keep up-to-date on new-use practices. Clean and maintain planting equipment regularly.

Ensure proper clean-up and disposal
Take care when cleaning up after planting seed and always follow provincial and municipal disposal requirements. Ensure that treated seed and dust are kept away from surface water. Properly dispose of any dust or treated seed remaining in planting equipment (for example, empty into a container and vacuum any dust remaining in the hopper) as well as any empty or leftover treated seed bags. Participate in collection programs for seed bags where available.

Exercise pollinator-friendly practices throughout the growing season
Bees collect pollen, nectar and water from different sources that could become contaminated with pesticide residue, such as flowering crops and weeds, water puddles or moist soil. Avoid contamination of plants, soil and water sources that may be used by bees. Consider providing pollinator-friendly habitat (for example, alfalfa, clover and wildflowers) away from active fields.

Wear personal protective equipment when handling treated seed
Always take care to avoid exposure to treated seed dust when opening and emptying treated seed bags, loading and planting treated seed, and during clean-up and disposal activities. Wear the appropriate personal protective equipment (PPE) for handling treated seed as specified on the seed tag and the product label. PPE may include long pants, a long-sleeved shirt, coveralls, shoes and socks, chemical resistant gloves, or a respirator.

Report suspected pollinator pesticide poisonings
Contact the appropriate federal/provincial authority in the case of any pollinator poisonings which may be related to treated seed. You can also contact Health Canada's PMRA at 1-800-267-6315.

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Clubroot Mitigation Efforts Continue

The latest research, best management practices and updates on areas of infestation — all in the name of clubroot prevention.

THE INTERNATIONAL CLUBROOT Workshop recently held in Edmonton, Alta., and organized by the Canola Council of Canada, was the culmination of the Clubroot Risk Mitigation Initiative, a project that received $4 million in funding from the federal government. June's workshop offered attendees new insight on boron and liming for clubroot mitigation efforts.

Scientists and farmers were among the industry stakeholders from Canada, the United Kingdom, Germany, Poland, Sweden and China who attended the workshop, which followed the annual meeting of the Canadian Phytopathological Society. The first day of the workshop focused on technical information on the disease while the following day covered practical clubroot information for farmers. A field tour of Alberta Agriculture and Rural Development's Crop Diversification Centre North research facility highlighted disease identification and equipment sanitation.

CCC agronomy specialist Clint Jurke says the conference showcased advances in scientific knowledge. "Our understanding of how the pathogen works has developed," he says.

For example, one study indicated adding boron to the soil prevents the clubroot pathogen from infecting plants; however, the levels needed are so high it is toxic to the canola plants.

Another new study showed liming soil to a pH level of 7 isn't a solution to clubroot. "It works in Europe but it doesn't work in Alberta. We have a different type of pathogen here. So it's expensive and it provides marginal benefits," says Jurke.

However, researchers demonstrated that planting canola early, in April or May before the soil warms up, means plants have a month of growth before the clubroot pathogen has a chance to develop in warmer soil.

Clubroot Spreads

Despite mitigation efforts, clubroot continues to spread in Alberta. The 2012 provincial survey reported the presence of clubroot in more than 1000 fields in 21 counties, although it's thought the actual number of infested fields is higher, as producers may be reluctant to report the disease. Clubroot has also been found at isolated locations in Manitoba and Saskatchewan.

"I suspect it will eventually spread through the established canola-growing areas," says Ron Howard, a research scientist in plant pathology at the Crop Diversification Centre in Brooks, Alta. "In Alberta, it's continuing to intensify here. It's definitely spreading and moving away from the Edmonton area. It's coming south, east and northward."

No established infestations have been found in the Peace River, Lethbridge or Taber regions.

Leduc County, meanwhile, continues to stay on top of new infestations by surveying hundreds of new fields every year.

Clubroot Quiz

Think you know how to prevent clubroot? Check your knowledge against the facts with the following **TRUE** or **FALSE** quiz.

1) Preventing clubroot is only important in canola fields.

2) If your neighbours don't take steps to prevent clubroot, there's no point in trying to manage it on your own.

3) Clubroot can be found in fields of cruciferous vegetables.

4) You should wear new booties or disinfected rubber boots each time you walk in a field.

5) To sanitize your equipment and prevent the spread of clubroot, it's good enough to brush the dirt off of equipment before moving it from one field to another.

6) Using resistant varieties of canola means rotating crops is unnecessary.

See page 26 for the answers.

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Resistant Varieties

Clubroot-resistant varieties of canola continue to be used successfully. New varieties, developed by Bayer, BrettYoung, Canterra, Dupont, Monsanto, Pioneer and Viterra have come to market this year, with more varieties in the pipeline. "Resistance seems to be holding up well, and the yield seems to be steady. We might even see the old resistant varieties replaced by a new generation of resistant varieties," says Howard.

However, the durability and stewardship of the traits concerns Howard. For example, the clubroot pathogen could build up tolerance to the clubroot-resistant varieties. Howard says this has happened in Europe, where clubroot-resistant varieties of cruciferous vegetables were grown continuously, and producers found resistance to the disease started to break down in the third year.

To improve the longevity of the trait, producers must maintain a standard four-year rotation. "The agriculture extension folks have gone further. They recommend you switch the resistant varieties in the fourth year. Each company's variety doesn't have identical resistance, there are differences," says Howard.

If a field is infested with clubroot, "avoid reusing your own seed," says Howard, as the seed could have clubroot spores mixed in with it.

Working with Oil Companies

Companies using farmers' land could track clubroot infection from field to field. A few cases have been reported of oil companies moving drilling equipment from an infested field to one in which clubroot hadn't been present before. In response, oil companies have worked to strengthen their sanitation practices.

Similar concerns have been expressed about recreational users of farm land, such as hunters and quad drivers, who can track dirt and, potentially, clubroot spores from one area to another.

Farmers must advise others using their land if it is infested with clubroot, so companies or individuals can sanitize their work or recreational equipment.

However, 99 per cent of the time it is farmers who cause the spread of clubroot by moving their equipment. "A farmer will move 300 pounds of soil with a tractor," says Jurke.

Despite advances in managing clubroot, misconceptions are abundant. One centres on the idea that clubroot-resistant varieties have solved all of the problems associated with the disease. "Some producers are not concerned about the disease because there are resistant varieties of canola now. Well, there are only about eight or so resistant varieties. Among them, there may not be a type that is suited to a particular producer's producing scheme," says Howard.

Meanwhile, some producers are still embarrassed or concerned to admit their fields are infested. This is unfortunate, says Jurke, because proper inspecting of fields is one way to manage infestation.

"People think if they get clubroot it's the end of the world, they have to quit farming. Once guys understand their options, it becomes more manageable," says Jurke.

Susan Peters

Farmers need to be aware of all the traffic on their land to prevent the spread of clubroot.

Clubroot Quiz Answers:

1) **FALSE:** Managing clubroot matters for all crops. Any time you move soil from field to field you can spread spores; for example, a drill going from a wheat field to a barley field.

2) **FALSE:** You should still work to prevent clubroot in your fields, even if your neighbours are not taking steps to prevent it.

3) **TRUE:** Clubroot can be found in canola, mustard and cruciferous vegetables like cabbage, broccoli, arugula, cauliflower and brussels sprouts. Clubroot also affects cruciferous weeds like shepherd's purse, stinkweed and wild mustard.

4) **TRUE:** Make sure your boots are properly disinfected when you walk in the fields, or put on booties.

5) **FALSE:** Brushing and scraping dirt off of equipment in the field will remove most of the soil, but to completely sanitize equipment use a pressure washer and disinfectant.

6) **FALSE:** Follow a standard rotation of three to five years when using clubroot-resistant varieties of canola.


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Charting a New Course

In order to stay current in domestic and international markets, the Canadian seed industry is working on evolving the new variety registration system. Over the past few years, key stakeholders have been debating how best to move forward in renewing a system that many argue is blanketed in regulation.

MANY WITHIN THE seed industry have long described variety registration in Canada as slow and burdensome. The length of time to get a new variety registered, they claim, puts the Canadian seed industry at a competitive disadvantage in both domestic and international markets.

"The variety registration system we have right now is very slow to respond. It is very cumbersome, and we need to make sure that we have a system in place that will allow producers to get varieties in the same timely basis as our competitors," says Patty Townsend, CEO of the Canadian Trade Seed Association.

Today, there are 53 crop kinds that are subject to variety registration and a total of 3,136 varieties currently registered. The Canadian Food Inspection Agency moved to streamline the system four years ago when it introduced a flexible variety registration system with the aim to reduce regulatory burden while continuing to maintain the core benefits of the variety registration system.

While the changes made to the system in 2009 have reduced some of the regulatory burden, most industry professionals feel more change is needed to increase its flexibility. "Everyone along the value chain recognizes that something needs to be done to make a more responsive, nimble system that fosters innovation and allows farmers access to new varieties more quickly. There are just some differences about how we will get there," says Townsend.

The requirements for new varieties are outlined in the Seeds Regulations in Canada's Seeds Act. Currently, crop kinds are grouped into one of three tiers, each one having different levels of performance requirements that proposed varieties must meet in order to be considered for registration by the CFIA.

Developing new commercial varieties takes many years of research. Developers typically spend as many as six to 10 years carrying out the necessary work to breed the desired mix of traits into their new varieties, and the regulatory processes only get engaged once this research is done. Once ready, developers present their work to an industry-led recommending committee to be entered into the committee's preregistration trials. The length of these trials is entirely determined by the industry experts of the recommending committees and its procedures, which determine how many trials are required to produce reliable quality, disease resistance and agronomic data upon which the committee can make its merit assessment. The number and type of preregistration trials is determined on a crop-by-crop basis by the various recommending committees. Once the committee has determined that the new variety brings value to the sector (has merit), the variety is passed to the CFIA for registration, which typically takes six to eight weeks at the end of this eight- to 10-year developmental process.

Variety registration is changing, with different requirements for the various tiers of crops.

For crops in Part I, for example wheat and canola, of Schedule III, an industry-led recommending committee must be in place.

Members of the committee set operating procedures that require new varieties to undergo two to three years of preregistration testing as well as merit assessment for key factors such as quality, agronomic performance and disease resistance. If the recommending committee determines that the variety performs as well as, or better than, varieties already available to growers, it is recommended by a vote of committee members and passed on to the CFIA for registration.

In Part II crops, for example safflower, there are requirements for a recommending committee and preregistration testing, but not for merit assessment. Part III crops, for example potato and sunflower, do not require a recommending committee, preregistration testing or merit assessment, as the requirements for these crop types have been deemed by members of their value chains to be excessively burdensome or ineffective. For crops in all three parts, basic variety registration information is required and verified by the CFIA.

Reducing Regulatory Burdens

The CFIA has proposed an amendment to reduce the regulatory burden on developers of new oilseed soybean and forage crop varieties. The CFIA recently published an amendment for public comment in the Canada Gazette Part I, proposing to move oilseed soybeans and forages from being listed in Part I of Schedule III of the Seeds Regulations to being listed in Part III of Schedule III. "The intent is to reduce the variety registration burden for these crop kinds by removing the requirement for a merit assessment and preregistration trials," says Patrick Girard, senior media relations officer for Agriculture and Agri-Food Canada.

In addition to oilseed soybeans, numerous forage crops would be affected, including alfalfa, bird's-foot trefoil, bromegrasses, canarygrass, lupin, orchardgrass, timothy, fescues, ryegrasses, wheatgrasses, wild ryes and several types of clover.

"Oilseed soybean varieties are currently still subject to full registration with a recommendation committee based on merit," explains Townsend. "And so our producers and seed companies don't have the ability to have access to those varieties for at least a year after producers and companies in the United States. This adversely affects our seed companies' logistics, transportation and entire marketing program. They can't launch in the U.S. or Canada, which puts their whole system at risk, and our farmers can't access those varieties either; therefore, they are not as competitive."

The CFIA's proposed amendment, entitled Regulatory Impact Analysis Statement, was published in March. It outlines the issues and amendment objectives as well as the rationale and implementation details of the proposal.

According to the statement, "a complete standard application package provides adequate information to enable the CFIA to continue to protect health and safety, prevent fraud and facilitate seed certification. The necessity for preregistration testing and merit assessment as well as associated monetary and temporal cost and any uncertainty in the outcome of the process would be removed."

The final decision for registering varieties identified in the amendment would remain the responsibility of the CFIA, which pledges to "continue to prevent fraudulent practices via the

Next Steps

In mid-August, Agriculture and Agri-Food Canada, the Canadian Food Inspection Agency and the Canadian Grain Commission released *Crop Variety Registration in Canada: Issues and Options*, which highlights the current variety registration system and outlines possible approaches for modernizing and streamlining it.

The options range from allowing flexibility in the current, recently revised system to emerge, to eliminating the federal government's role in the variety registration process completely.

Option 1: The status quo. The paper notes significant changes to the system were made in 2009 and "it could be argued that the current system has not yet been in place long enough to demonstrate all of its inherent flexibility."

Option 2: Streamline the process by requiring all crops meet minimum registration requirements with the option for some crops to have merit assessment through an independent assessment process.

Option 3: Streamline the process by maintaining a minimum level of federal government oversight similar to the current Part III and eliminate the mandatory requirement some crop kinds have for merit assessment.

Option 4: Withdraw federal government oversight, allowing the industry or third parties to assume the role.

The options are meant to complement the review the crop variety recommending committees were asked to undertake earlier this year after Agriculture Minister Gerry Ritz requested they consider streamlining their operating procedures.

AAFC is accepting comments on the paper until Nov. 30. "It is still early days for the engagement process," says AAFC spokesperson James Watson. "We will review all of the results of the online engagement and other feedback we receive with a view to developing a refined policy proposal in 2014," he says.

"Everyone along the value chain recognizes that something needs to be done to make a more responsive, nimble system that fosters innovation and allows farmers access to new varieties more quickly."

– Patty Townsend

characterization and identification of varieties and ensure an appropriate level of regulatory oversight that is commensurate with risk, thereby maintaining market confidence in [a] regulatory framework."

The proposed amendment comes after considerable discourse on the topic since October 2009. This includes the circulation of discussion documents seeking feedback, question and answer sessions at industry gatherings and numerous teleconference and face-to-face meetings — all in pursuit of building consensus for the proposed change.

According to Brian Lemon, director of field crops and inputs with the CFIA, "It was important to build consensus among all the various value chain groups, who sometimes have differing perspectives. Producers' interests, as well as the interests of processors, breeders and the seed companies, all needed to be heard and considered as consensus was developed." Thus discussions had to involve all aspects of the value chain, including seed companies, producers, public and private plant breeders, university researchers, recommending committees and major industry associations such as CSTA and the Canadian Seed Growers' Association.

Coming to a consensus is not an easy task with numerous players and differing opinions. However, the CFIA statement says, "the movement [of oilseed soybeans to Part III] is well supported by all key stakeholders and is expected to cause little to no controversy."

Benefits of Proposed Amendment

While the CFIA maintains the proposed changes will not affect consumer protection, it is expected to impact numerous stakeholders within the seed industry, including seed growers, suppliers, public and private variety developers, and recommending committees.

The CFIA also believes the proposed amendment will benefit companies from large multinational corporations to local breeding operations in terms of timeliness, increased innovation and cost savings. These benefits include the removal of the time delays and uncertainties associated with the current regulatory requirements, savings from the removal of preregistration testing fees, quicker commercialization of new varieties and faster returns on research and development investment. In addition, the amendment is expected to reduce business risk and improve the ability of seed developers to adapt to changing markets.

Although much of its focus has been on oilseed soybean and forage crops, CFIA and value chain members are open to evaluating the variety registration process for all crop kinds, where stakeholders may wish to change parts. The CFIA says it's committed to considering proposals to decrease the regulatory burden by moving crop kinds from Part I to Part II or Part III on a priority basis. The agency adds that any changes will be based on the strength of the rationale and the degree of consensus within each crop value chain.

Department of Agriculture Urging Change

In February 2013, Agriculture Minister Gerry Ritz addressed a letter to all 17 recommending committee chairs. The letter called on the committees to re-examine how they operate as well as to reassess their current procedures such as data requirements and number of years of preregistration testing.

"The recommending committees have been asked to include recommendations in response to the minister's letter in the next annual update of their operating procedures, due to be submitted to the CFIA for approval in fall/winter 2013–2014," says Girard. "Some crop value chains have begun to discuss the evolution of variety registration requirements for their crops in response to broader changes in the crop production sector."

Since then, the Prairie Recommending Committee for Wheat, Rye and Triticale, for one, has struck a working group from its membership to review those areas of the operating procedures that were raised in Ritz's letters.

"Eleven people were selected from the approximately two dozen members that volunteered to assist in this task," says Brian Beres, chair of the committee. "The working group members chosen represent all points along the value chain for wheat including producers, breeders, agronomists, pathologists, grain quality experts, grain merchants and end users. The affiliations range from public institutions, universities, grower commissions and private industry including life sciences companies."

The committee informed the minister of its strategy for reviewing operating procedures in early May, Beres says, adding the working group plans to hold meetings every two weeks until the process is complete.

"The working group members chosen represent all points along the value chain for wheat including producers, breeders, agronomists, pathologists, grain quality experts, grain merchants and end users."
– Brian Beres

Minister Ritz has also pledged to hold both formal and informal stakeholder engagement on the variety registration issue, which are expected to begin soon.

"If we can work towards a more flexible system that still maintains environmental safety and health and safety — which is the responsibility and requirement of regulation — then we will have companies that will look more towards investment in those crops, as well as the development and plant breeding in those crop areas, which will only bring more availability to our farmers and make us more competitive in the marketplace," explains Townsend. **Jen Golletz and Julie McNabb**

CLOSING THE BARLEY GAP

Industry stakeholders continue to work on many fronts to increase market opportunities for all barley types.

THE YEAR 2013 was a great one for barley. Good growing conditions provided average yields of 64 bushels per acre across Western Canada. But it'll take a lot of record yields to compensate for the steady drop in barley acres over the last five years. There were 8.6 million acres of barley planted in Canada in 2009, and that figure was down to just over 7 million this year.

A number of factors are behind the downward trend in planted barley acres. For example, a depressed livestock industry has kept feed barley prices low, prices for malt barley have not risen despite dwindling supplies and barley has a lot more competition now from other cash crops like canola and, increasingly, corn and soybeans across Western Canada.

Corn and Soybeans Honing In

"The increase in soybeans we've seen in Manitoba is just incredible in the last year," says Rob McCaig, managing director and director of brewing at the Canadian Malt Barley Technical Centre. "The varieties that have been developed are allowing soybeans and corn to be grown in areas where they wouldn't fit into the short growing season before. I've seen corn grown as far north as Edmonton."

The barley industry is at something of a disadvantage in terms of breeding, says McCaig, because it still relies on traditional back-crossing techniques to come up with new varieties, a process that averages about ten years to complete. Compare that with genetically modified varieties of canola, corn or soybeans, which can be delivered often in three years, and it's little wonder progress on new barley varieties delivering yield advantages or disease resistance has been much slower than that of GM crops. Neither is it likely that barley, especially for food or malting use, is going the GM route any time soon. "There really is a reticence from the brewers and maltsters to do anything in terms of GM because it is a fairly sensitive consumer product," says McCaig.

Malt Barley Acres Down

As far as the malting and brewing industry is concerned, less acreage certainly isn't a reflection of less demand, says McCaig. On the contrary, as beer consumption continues to rise worldwide, the demand for malting barley has been increasing between 2.6 per cent to 3 per cent a year and looks set to continue that way. One would expect that with demand increasing and supplies down by about 10 per cent since 2000, malt barley prices would be strong, but that's not the case. "Malt barley prices are at a three- or four-year low," says McCaig. "But it's one of the few things that the brewers can control. They can't control the price of labour or the price of glass or aluminum, but they can control the price of malt barley, and they do tend to keep the price lower. That's going to change soon because they're going to reach a crossover point where there's going to be a demand and the supply won't be there."

Malt barley has the added disadvantage of being a high maintenance crop and riskier to grow than many of its competitors. "When you are growing canola or soybeans there is nowhere near the level of risk that you have with malt barley," says McCaig. "If you're growing malt barley you may only be selected 30 to 40 per cent of the time, and the rest of the time it will have to go to the feed market at a much lower price. Every week you've got to check a malt barley crop to make sure everything is just right. So there are those factors playing against it for sure."

"The food barley market holds great potential for producers and consumers."
– Matt Sawyer

New Uses and Markets

For growers to stay invested in barley as a crop, there are a number of things that need to happen, and the industry is working in many different areas to try and create increased market opportunities for all types of barley.

Alberta Barley Commission staff have participated in recent trade missions to Korea and Japan, both of which are showing interest in Canadian feed barley, where it's felt there is a good market for barley for human consumption.

Health Canada recently permitted a health claim for barley, which should help boost its image as a healthy food. "The health claim for food barley states that if you eat three grams of barley beta-glucan daily, which is a soluble fibre, it helps to reduce your cholesterol, which is a risk factor in heart disease," says Matt Sawyer, chair of the Alberta Barley Commission. "The food barley market holds great potential for producers and consumers."

Other novel uses include neutraceuticals. Research at the University of Alberta led by associate professor Lingyun Chen is investigating the use of barley protein as a microencapsulation material to protect materials such as fish oils from oxidization and allow better transportation of medicines through the human digestive system to target areas.

The search continues for a Canadian barley variety that can be used to manufacture Shochu, a highly popular Japanese distilled barley beverage. This collaborative research project involves AARD, the University of Alberta and a Japanese shochu company, who are testing material from Canada's barley breeding programs. The project is funded by ABC and other industry and public partners.

Collaboration Required

The need for barley research is more important than ever and must be focused and collaborative in order to meet the needs of the industry as a whole, says Sawyer. Increasingly, public and

private industry partners are collaborating to develop new barley varieties that offer not just a sound agronomic package, but also meet the nutritional and functional needs of end users.

It does, however, begin with agronomy and Barley 180 is a project, funded jointly by ABC and the Alberta Crop Industry Development Fund, which is looking to improve the production and yield of barley and determine if the maximum yield can exceed 180 bu/acre.

Feed barley accounts for 85 per cent of the barley acres in Alberta and ABC recently formed a Feed Coalition between livestock producers, barley growers and industry partners. "It's a collaborative approach to try and see what we as barley growers can do to help ensure that our livestock industry stays profitable as well," says Sawyer.

The Brewing and Malting Barley Research Institute, which brings together industry members from the brewing and malting industry, producer groups, and seed and genetics companies, recently announced $81,000 in research grants for three research projects that will improve malting barley varieties, barley production and processing quality. The Crop Development Centre at the University of Saskatchewan will receive a new Phoenix Micro malting unit to assist in its two-row malting barley breeding program. A project at the Alberta Agriculture Field Crop Development Centre in Lacombe will be looking at detecting fusarium head blight resistance in barley lines, and Agriculture and Agri-Food Canada researchers at Lacombe will be working at improving malting barley characteristics through the production of more homogeneous seed.

"This is the first time we have had a focused national barley cluster and we are bringing together some of the best research minds that we have in this field."

– Garson Law

On the malt barley side, it's not just in the area of research, says McCaig, that the industry needs to come together. If barley acres are to rise again in Canada there must be some element of shared risk, he says. "I think there's an opportunity now for partnering between the breweries, malting companies and the growers in terms of risk management for growing the crop, because that's one of the things that is missing," says McCaig. "If the spread

between feed and malting barley is $50 and a company has got a farmer that's been in its program growing malt barley for many years, just because Mother Nature is not kind to him and he doesn't get selected this year, instead of him losing $50 a ton the company splits the loss at $25 a ton and gives growers a bit of a premium to keep them in the system."

The Barley Cluster

As part of its five-year AgriInnovation program, Agriculture and Agri-Food Canada recently invested $8 million in the National Barley Research Cluster, a Canada-wide, public/private collaborative initiative. The cluster will fund 28 research projects at AAFC research facilities and universities in Saskatchewan, Alberta, Manitoba, Ontario and the Maritimes. Other funders include the Alberta Barley Commission, which is administering the program, Rahr Malting, the Western Grains Research Foundation and the Brewing and Malting Barley Research Institute. "This is the first time we have had a focused national barley cluster and we are bringing together some of the best research minds that we have in this field," says Garson Law, ABC's research manager. "The future really is in collaboration and working across the country together helps us make greater strides in the research program for barley."

The barley cluster projects will focus on four major areas. The breeding and genetics area will be looking at the development of new varieties of six-row malting, two-row malting, and feed barley and hulless food barley. Other research includes improving fusarium and scald resistance, gene mapping and the development of marker technology for the rapid identification of malting barley varieties.

Agronomic projects include an assessment of plant growth regulators, a project to evaluate yield response to nitrogen rates, the effect of seeding rates on beta-glucan levels, and development of alternative sustainable and reduced input strategies for crop and pest management and their effects on silage value and feed quality.

Pathology projects will examine how pathogens that cause diseases such as scald, net botch, common root rot and spot blotch response to geographic location and genotype, plant growth stage and host tissues, and the how seed treatments and foliar fungicides interact with variety resistance and plant growth regulators.

Two valued-added projects concentrate on food barley and are evaluating the role of barley beta-glucan on human glycemic response and the optimization of primary processing protocols to improve whole grain barley product nutrition, safety and flavour.

"They are all very critical projects and will lead to the strengthening of the barley industry, and barley as a crop," says Law.

The Future of Barley Production

There are plenty of good reasons for farmers to stay invested in barley, whether they are growing it for feed, food or malting, says Sawyer.

Malt barley prices will inevitably need to rise, says McCaig, as demand continues to rise and supplies become tighter. Once the signals of an open market for barley are more clearly understood

by growers and the global industry as a whole, says McCaig, there should be more stability. He predicts that will push barley more into the specialty crop category and more acres in Canada will be contracted. "In the U.S., 85 to 90 per cent of malt barley is grown under contract. In Canada it's currently about 20 per cent. I think there will be more partnerships, and with companies in South America wanting more malting barley of the Canadian type, I can see them coming in and partnering with farmers to get the quantity they need."

There will always be a demand for barley, says Sawyer, and it's up to the industry to promote it. "I think the future for barley is bright; it's a cost-effective crop to grow and there's certainly lots of potential for barley," he says. "I think we need to continue to stay invested in research, and it's a very exciting time for barley."

Angela Lovell

Better Barley

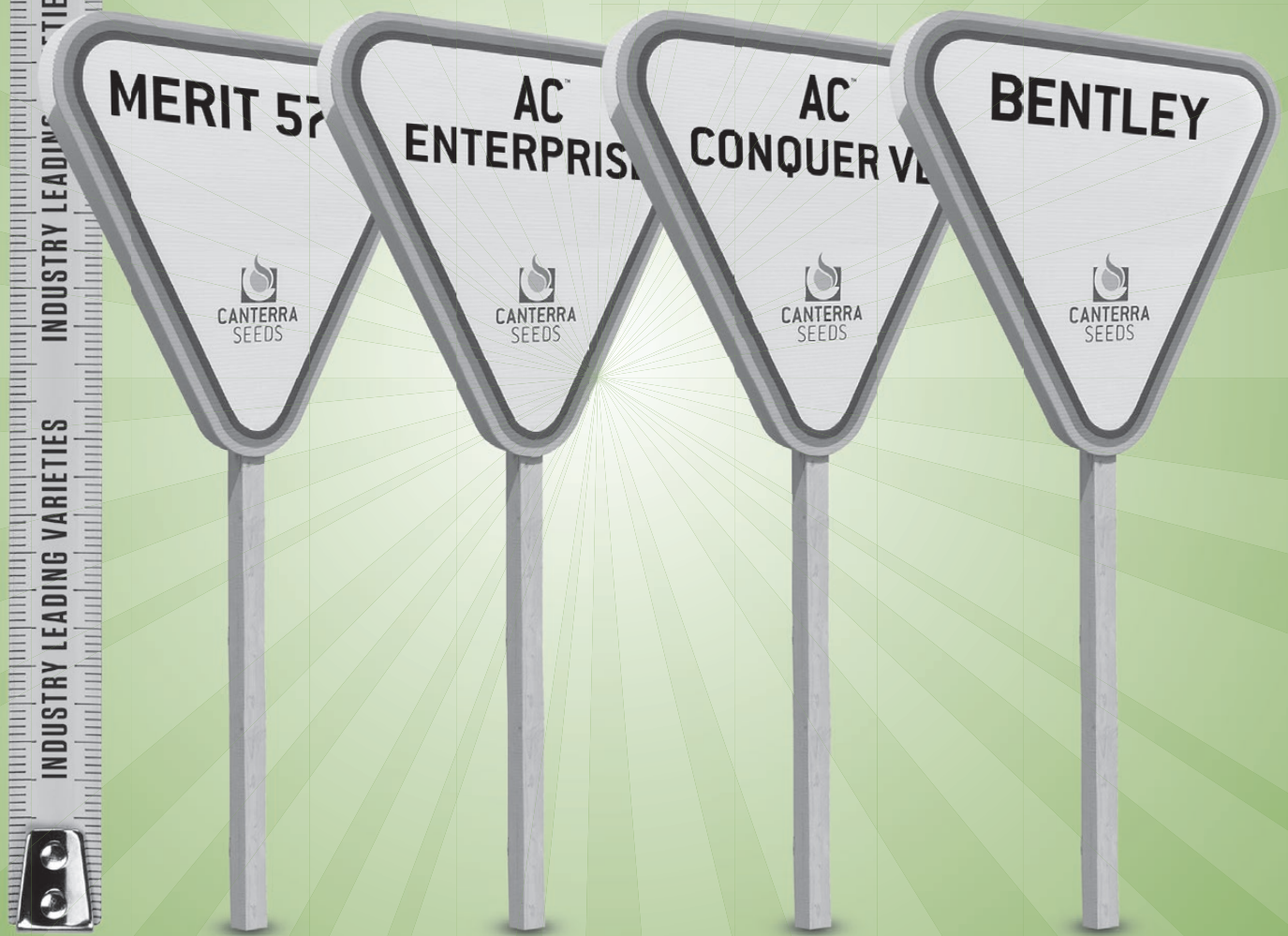
MillerCoors is concerned about the long-term sustainability of malt barley production. The company is now conducting research to find new barley varieties and agricultural techniques that support the goals of the entire barley supply chain from growers to its brewers.

MillerCoors understands water availability and other environmental and economic pressures can affect its long-term access to barley. Its research and development team has developed techniques to reduce the amount of water required for barley production under irrigation. In 2011, MillerCoors partnered with the Nature Conservancy to test water conservation practices at a showcase barley farm in Silver Creek Valley, Idaho. It used modified pivot irrigation systems to minimize the amount of water used to grow barley. In the first year, precision irrigation techniques increased crop yields while reducing demand for energy and water. The farm saved 124.5 million gallons of water, which equates to a nine per cent reduction in total water use. By pumping less water, total energy usage dropped by 10 per cent to 20 per cent.

In Idaho, barley yields increased 35 per cent since the 1970s, from 100 bushels per acre to 135 bushels per acre. Improved barley yields in 2011 saved 7.35 billion gallons of water relative to barley yields in the 1970s.

New varieties and practices are field-tested on the company's own farms. Through the help of its research and development team, 97 per cent of its growers' barley met the company's standards in 2011.

DO YOUR VARIETIES MEASURE UP?



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END POINT ROYALTIES

How can cereal producers have future access to the best global genetics for wheat and barley? One solution is an end point royalty.

PRODUCERS DEPEND ON new technologies to keep cereals competitive in crop rotations and in world markets. Globally, private cereal varieties are now under development that could create important benefits and changes for producers in Canada.

Public Breeding in Canada — A History of Success

In addition to early maturity, which is so important in our short growing season, breeders have continuously improved yield, quality and disease resistance in Canadian cereal crops. In Canada, wheat and barley variety improvements, like in the United States, have been done primarily by the public sector. More than 100 years ago, the federal government established agricultural research and experimental stations to support economic development in Canada. Wheat received special focus, as it was well suited and strategic to the development of the Prairies.

Western Canada's short growing season, low rainfall and unique plant diseases required a long-term commitment and vision to develop the highly adapted germplasm found in public breeding programs today. In fact, varieties from public breeding today represent more than 85 per cent of the seeded wheat acres in Western Canada (in the U.S., more than 70 per cent).

In recent years however, public breeding investment in real dollar terms has been eroded due to inflation and public sector budget cuts. Partially offsetting this has been a producer-funded levy (check-off) on wheat and barley that was introduced in 1993 and administered by the Western Grains Research Foundation. These levies by law could only be used for wheat and barley breeding research. It is estimated that this producer contribution to breeding research has paid for approximately 30 per cent of the cost of public breeding projects (excluding assets and overhead costs).

Over time, Canada's public breeders have developed a unique and valuable wheat germplasm. This is the result of a 100-year wheat breeding history that has emphasized milling quality and protein content.

Wheat — The Last Frontier

The breeding of wheat is genetically complex and complicated by agronomic factors. This makes breeding efforts expensive. The practice of using farm-saved seed (FSS) makes royalty collection difficult and results in a low return on investment for breeders. As a result, private companies which have become world leaders in the breeding of corn, soybean, canola, fruit and vegetable crops have not been as active in cereal crop breeding.

However, things are changing. Wheat is the second-largest crop in the world and private breeders see business growth opportunities in markets where the investment climate is right. Barley is also being displaced by corn in some areas as shorter season varieties become available. Wheat breeding is global, as demonstrated in the New Private Wheat Research Investments Timeline following this article.

Investment Climate and UPOV 91

Canadian producers need access to the best technologies available in order to improve yields and address other agronomic issues as they emerge. While public breeding will continue to play a significant role in technology and variety development, Canada must also encourage global seed company investments in wheat and barley breeding, and to do so the right investment climate must exist. To make this happen, the federal government is considering updating Canada's Plant Breeders' Rights (PBR) Act. Amendments under consideration would cause PBR legislation to conform to the most recent international standards, called UPOV 91. Conforming to UPOV 91 would give plant breeders in Canada more opportunity to collect royalties on PBR protected varieties. This would improve returns on plant breeding investments for both public and private plant breeders while also increasing intellectual property protection of varieties.

For producers, a key outcome of applying UPOV 91 standards is that breeders will be eligible by law to receive a royalty on their varieties any time seed of their protected variety is planted. For cereal producers, this would include farm-saved seed. This creates a dilemma. Producers need and want access to the best genetics so that they can continue to produce high-quality, internationally competitive products, but also want the cost savings that come with planting farm-saved seed. An end point royalty offers a solution.

End Point Royalty — What is it?

How can a royalty be collected on FSS? One method is for producers to keep records of the amount of FSS stored and sown. This method is used in Uruguay. Twice a year, breeder's representatives visit each farm to record the variety and quantity of FSS planted. In Western Canada, visits to individual farms to record seed storage and planting data would be costly to administer because of the large number of farms and the distance between them. This level of oversight would also be objectionable to most farmers.

UPOV 91 standards allow that if the breeder does not have 'reasonable opportunity' to exercise his right to collect a royalty on the seed (in this case, FSS or certified seed), then the breeder may collect a royalty on the grain that is produced from the seed. When the royalty is collected on the grain harvested and not on the seed, it is called an end point royalty (EPR).

End point royalties have proven to be successful in Australia at financing crop breeding. First introduced in 1996, wheat varieties with EPR have reached more than 80 per cent of the market share. One reason it works so well is that it provides a return to breeders when FSS is planted. As Ross Kingwell, an economist at the University of Western Australia, says: "Where farm-saved seed is common practice, the characteristics of end point royalties are shown to make them a preferred means for financing crop breeding by variety developers, governments and many grain growers."

How EPRs Work

An EPR is a mechanism used by plant breeding companies to recover their return on investment. It is a risk sharing mechanism since the producer of the crop pays a royalty on the production and not on the seed. The amount of the royalty is set by the breeder and may be dollars per tonne or a percentage of value.

The EPR is a royalty charge imposed on the first sale of harvested material derived from varieties protected by plant breeders. If the EPR is charged, then no royalty is applied to the certified seed. Breeders are not allowed to collect two royalties on both seed and on production. When a producer chooses to plant a variety protected by PBR (under UPOV 91 standards), it becomes the law to pay the royalty as established by the plant breeder. If a producer does not want to pay EPR, then the producer should not utilize the technology of the PBR-protected variety by planting the seed.

When grain is delivered to the first point of sale, the producer will declare the variety name. If an EPR is in effect on the variety, the grain buyer will deduct the royalty amount due to the breeder and remit the funds to the breeder or to the breeder's agent.

Advantages to End Point Royalties

1. Practical, streamlined method of remitting a royalty on PBR-protected varieties, resulting in a low administration cost.
2. Buyers in Western Canada have already established the administrative systems for check-off (levy) collection.
3. More practical to implement than a royalty on FSS and less offensive to farmers, as collection does not require on-farm monitoring.
4. EPR is a performance-based royalty system; producers and breeders share the risk of variety performance.

Debunking the Myths

Will Producers Pay Twice?

Producers currently pay a compulsory but refundable check-off (levy) for wheat and barley development via provincial wheat and/or barley commissions. If an EPR is introduced, some

Timeline for Recent Private Wheat Research Investments:

2008
- World's largest wheat breeder, Limagrain, purchases shares in Australia's largest private wheat breeder.

2009
- Bayer expands seed and traits business to include wheat.
- World's largest seed producer, Monsanto, expands to include wheat.

2010
- Bayer buys wheat breeding program in Ukraine.
- Monsanto invests in Intergrain, Australia's second largest cereal breeder.
- Limagrain starts a North American wheat breeding and seed program.
- Syngenta enters hybrid wheat business.

2011
- Dow buys Washington company to expand wheat seed program.
- Bayer establishes European Wheat Breeding Centre.

2012
- Limagrain and Canterra Seeds partner to test varieties for Canadian Prairies.
- Bayer establishes wheat breeding station in Saskatoon.

2013
- Bayer announces building of global wheat breeding network. First varieties expected 2015.
- Bayer and Crop Development Centre (CDC) collaborate on striped rust disease resistance.
- Dow and CDC collaborate to develop some wheat varieties.

producers may think that they are paying twice for the same thing. They are not. The commission check-offs currently support research, market development and technical assistance programming in Western Canada. This is producer money used to support activities determined by producer representatives. An EPR, on the other hand, is money owed to the plant breeder for use of the variety protected by PBR. It is not refundable. Its purpose is to provide the breeder with a return on investment for their cost and risk in developing the new variety. An EPR and a check-off are two distinctly different mechanisms achieving different outcomes — producers do not pay twice for the same thing.

Will EPR Harm the Seed Industry?

Breeders currently collect a royalty built into the price of a certified seed. Some worry that if the royalty is moved from seed to grain production, it will harm seed growers and seed companies. Application of EPR does not change the Seeds Act in Canada and will not reduce the vitality and role of the pedigreed seed industry. Seed growers and seed companies will continue to be needed for cereal seed production and distribution. Contrary to the seeding practices in the canola industry, where five pounds of canola is needed to seed an acre and seed is processed at central locations and shipped to customers, wheat and barley have much higher seeding rates — making seed production and processing decentralized across the Prairies. Cereal breeders will continue to need local suppliers and distributors to provide cost-effective offerings to producers.

Canadian producers need access to new technologies and global genetics. The implementation of an end point royalty in Canada will help attract global investment in cereal breeding. To maintain pace with other competitors, Canada needs a strong investment environment that rewards private companies for their investment and risk in developing new, improved cereal varieties.

Stuart Garven

Editor's Note: Stuart Garven is a management consultant specializing in the agriculture and food industries. He has been a member of a team of consultants that has conducted an investigation into the development of a new cereal breeding model for Western Canada. The model includes new funding methods and partnerships in cereal breeding involving producers and the public and private sectors. Further details on the model are available on the web at www.seed.ab.ca. The Alberta Seed Growers' Association has provided leadership by creating a consortium of producer organizations that have funded and undertaken this investigation. In addition to funding from some producer organizations, funding for this project was provided in part by Agriculture and Agri-Food Canada's Canadian Agricultural Adaptation Program, which is managed in Alberta by the Agriculture and Food Council of Alberta.

Agriculture & Food Council of Alberta

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A Clearer Picture

Forages are often an undervalued and overlooked source of profitability, says an industry expert, suggesting western Canadian producers should take a long, hard look at forages and their previous notions of costs versus returns.

FOR TOO LONG, forages and grasses have been considered the "poor cousins" in the crop sector, says Arnold Mattson, a pasture stewardship specialist and former rancher. "Grasses are one of the least understood crops — and I stress the word crops — out there."

Mattson maintains grass as a crop rivals wheat, canola and barley in importance and economic returns, and he has data to back up those claims. Spurred on by his own average net returns of $55 per acre for grass — while fellow producers were shooting for $30/acre on canola — and to illustrate that forage is undervalued, Mattson headed up a study through Alberta Agriculture and Rural Development's AgriProfit$ Business Analysis and Research Program to compare returns for canola, wheat, barley and grassland over a 10-year period in three soil zones. Those results are raising some eyebrows.

According to the study, for example, net returns per acre for spring wheat, canola and grass in brown soil were $24.05, $45.34 and $55, respectively, whereas barley lost $13.03. In black soil, grasslands reported a net return per acre of $96, compared with $24.15 for spring wheat, $4.50 for barley and $87.16 for canola.

TABLE 1. COST AND RETURN PROFILES ON FIELD CROPS AND GRASSLANDS 2000–2011

	Brown Soil Zone (dollars per acre)	Black Soil Zone (dollars per acre)	Grey-Wooded Soil Zone (dollars per acre)
Spring Wheat	24.05	24.15	9.61
Barley	-13.03	4.50	11.65
Canola	45.34	87.16	65.78
Grass	55.00	96.00	75.50

Source: AgriProfit$ and Graziers

Redefining Profit

Years ago, Mattson conducted a survey of the value western Canadian ranchers placed on pastureland. "The No. 1 reply I got was 'nothing, because you can't farm it,'" he says.

Because grass farmers plant grass for their livestock to graze, then harvest the livestock and sell the meat, livestock is often credited for any profits, often confusing the calculation of costs and returns.

The value of forages is often misunderstood because producers consider pastureland a cost centre, rather than a profit centre.

The value of forages is often misunderstood, says Mattson, because producers consider pastureland a cost centre. "It's the backbone of our livestock industry and because the money has come from the livestock, the producers look on grass as a cost centre and not a profit centre," says Mattson. "If you look at grass as a profit centre it takes on a different role…. You start taking better care of the grass and when you [do that] all of a sudden you see your whole enterprise becoming more profitable."

According to Mattson, farmers separating the forage enterprise from the livestock enterprise while applying fair market value of the forages to their calculations on a per-acre basis will gain a more accurate picture of the profitability of forages and grasslands.

THREE
CROP DISEASES.
ONE
GROWING RISK.

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BLACKLEG
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WHAT YOU SHOULD DO

Take proper care and precautions:

- Evaluate risks by scouting for signs and symptoms – if you want to know, you have to scout
- Deploy cultivars with disease resistance and adopt good rotation practices to help avoid build-up of diseases
- Ensure seed, soil and equipment are clean to avoid spreading diseases to new fields

WHERE YOU SHOULD GO TO LEARN MORE

Get fully informed about Fusarium, Clubroot and Blackleg by visiting **agric.gov.ab.ca** or call **310–FARM (3276)** toll-free in Alberta. You can also pick up a fact sheet at your local agricultural fieldmen's office.

Canada Alberta Government Growing Forward 2

Mattson recalls his early days as a grazier, and what this shift in perspective might have meant to his bottom line. "I just turned the cattle out in the spring … I never once stopped and considered how I managed [the grasslands]. If I knew then what I know now, I could have double or tripled the carrying capacity on the land and the returns off of it. I didn't know," he says.

"Grasses are one of the least understood crops — and I stress the word crops — out there."

– Arnold Mattson

His advice to others growing grass and forages: "Learn how to gain the profitability from that grass, recognize it is a crop and look at it from that perspective. Decisions will then be based upon the bigger picture, which is about more than just cattle."

A 10,000-foot view also considers the ecological and social benefits of forages and grasslands, such as watershed protection, water quality improvement, biodiversity conservation, carbon sequestration, soil conservation, habitat for pollinators, insects and wildlife, and tourism and recreation. "It's vital to our sustainable society," says Mattson. "The value of forage if you look at the net return for your own profitability and also the total value to our air and water quality — to our quality of life — it's huge."

Pasture Management

Like other crop kinds, management of grasslands and foraging animals is the key to healthy stands and productivity, says Mattson,

Bloat-Free Grazing of Alfalfa Pastures Closer than Ever

As early as 2016, commercial seed for sainfoin, a bloat-free legume that when grown in mixed stands with alfalfa prevents bloat in grazing animals, could be available to producers. Previous sainfoin cultivars in mixed alfalfa pastures did not survive for long or grow back rapidly enough after the first grazing or cutting to prevent bloat.

Researchers at Agriculture and Agri-Food Canada's Lethbridge Research Centre have solved that problem with the development of the new sainfoin cultivar Mountainview. Studies and test trials indicate the new cultivar not only grows back at the same rate as alfalfa after the first grazing or cutting in mixed stands, but also survives for up to four years. "The new populations have maintained about 30 per cent sainfoin in the mixed alfalfa stand and there is almost no bloat," says Surya Acharya, a forage breeder at the centre.

The productivity of animals grazing on mixed stands of Mountainview and alfalfa was compared with that of animals grazing on pure alfalfa stands. "There is no statistical difference between the two," says Acharya. "What this means is we have populations [of sainfoin] that can survive in alfalfa stands and will not cause bloat but prevent bloat, and there is no loss of plant or animal productivity."

In fact, in simulated grazing trials, the new sainfoin populations produced as much biomass as some of the alfalfa varieties. "All in all, it looks like we have developed something that can give us multiple cuts per year, which the old variety was not giving us," says Acharya.

The Farm King grain vac is an efficient way to transport grain from bin to truck, bin to bin, storage shed to truck and basic bin cleanup. The high vacuum suction carries the crop on a pillow of air and aids in cleaning out trash particles as the crop goes through the grain vac. The versatility of the grain vac hoses and cleanup wands allow the operator to access hard-to-reach areas for superior cleaning. The optional self-contained hydraulics allow the grain vac to be fully operational without using the hydraulic ports of the tractor.

Farm King

Airlock

Blower

Camlock Couplers

"Find the most successful grass farmer in your area and talk to him. Learn from that — it's the best way to go about it."

– Arnold Mattson

and integral to that is learning to work with nature. "A grass blade is like a solar unit. If you've grazed it down, there's no solar panel to catch the sunlight to grow more grass. It then has to get its food from the roots — deteriorating the stand."

Grazing at the appropriate stage of growth is also critical, he says. "If you graze it too late when it's tall and it has gone to seed, the productivity and quality is gone. If you graze it too soon there's no root development and therefore no activity in the soil to create nutrients for growth."

According to Mattson, teaming up with a forage mentor is the best possible route to achieving increased productivity and profitability from pastureland. "Find the most successful grass farmer in your area and talk to him. Learn from that — it's the best way to go about it. Every pasture is different. Every forage situation is different. There is help out there, but because grass is so unique according to climate, it's best to find someone in your local area."

Mattson encourages producers to spread the message about the real value of forages whenever and wherever they can. "I tell grass and forage people, 'you've got a story to tell. You've got something that is key and is vital to the sustainability of our society as well as agriculture. The wealth is in the grass and the soil. How we use it affects its profitability," he says. **Kari Belanger**

Arnold Mattson, a pasture stewardship specialist, says grass as a crop rivals wheat, canola and barley in net returns per acre.

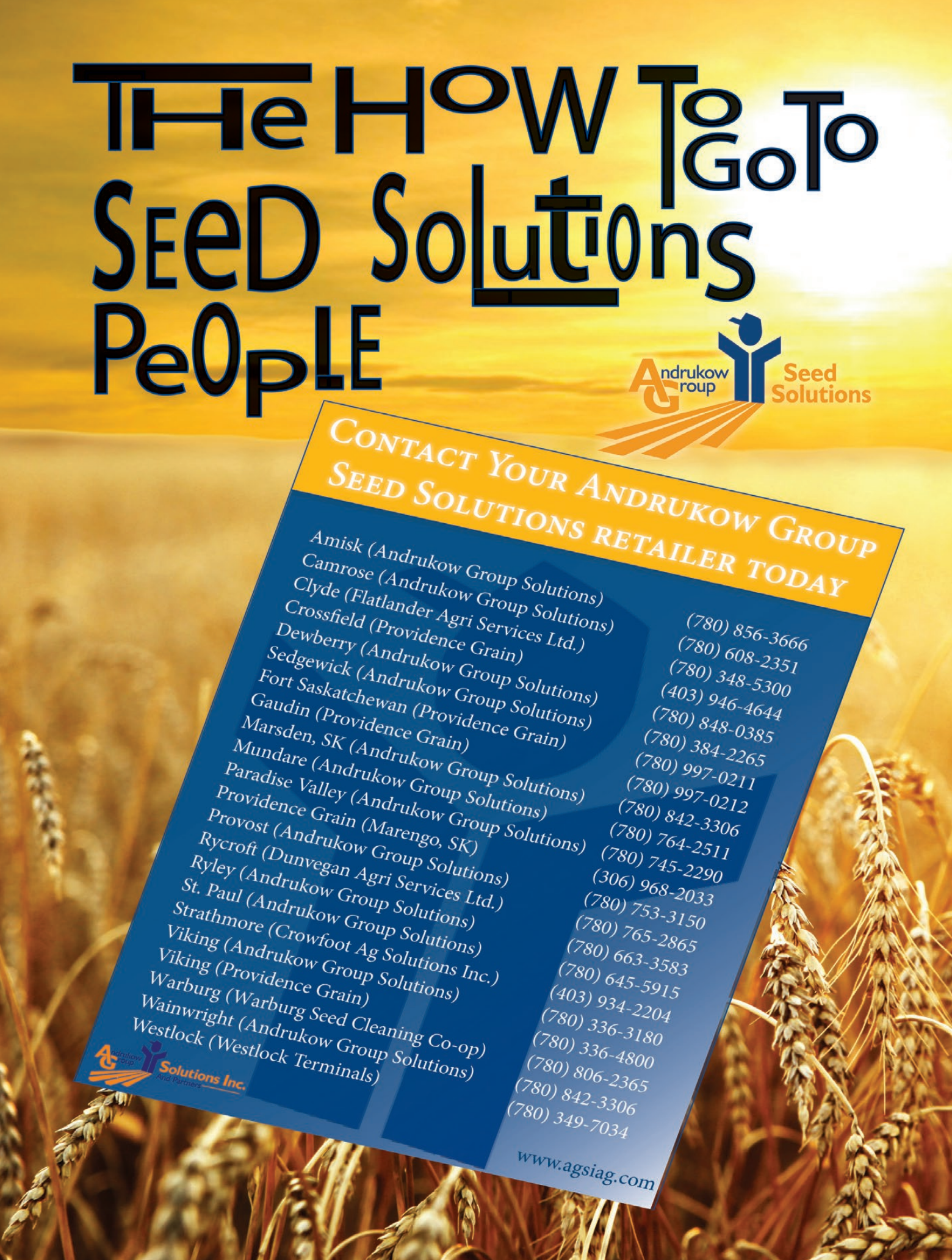
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Photo courtesy of the Field Crop Development Centre

Taza triticale was developed at the Field Crop Development Centre in Lacombe.

FLOURISHING in their FIELD

FROM ITS HUMBLE BEGINNINGS, THE BREEDING PROGRAM NOW HOUSED AT THE FIELD CROP DEVELOPMENT CENTRE HAS WITNESSED MANY SUCCESSES OVER THE LAST 40 YEARS.

IN 1972, THE Western Hog Producers succeeded in convincing the Alberta minister of agriculture that funding was needed in order to support the Feed Barley Breeding program. The program, which also had the support of the Alberta Pork Producers Marketing Board, was to focus on protein quality and quantity. Originally, it looked at the development of high lysine barley, but later broadened its scope to include other cereals that could be used for grain and forage production, and eventually became the Feed Grain Development Program.

In 1973, James Helm, project leader and head of research at the Field Crop Development Centre, was hired to head the research program. At that time, the program's objectives were to produce high-yielding, high-feed-value cereal grains for the livestock industry. Helm has a long history in plant breeding and has worked with some of the best in the industry.

"I was 19 when I started in plant breeding research," says Helm, who is 69 years of age today. "[There was a] very distinguished group of mentors at Washington State University, including Dr. Orville Vogel, who decided I was a stubborn enough kid to make a good plant breeder, and Dr. Norman Borlaug, who won a Nobel Peace Prize for feeding the world. Those were the two original people who got me going all those years ago."

The program moved to Lacombe in 1978, where approximately 250 acres of bare land was purchased for the purpose of creating a research farm. Two years after opening, respected cereal researcher the late Don Salmon was brought on board to lead the development of spring and winter triticale and winter wheat varieties. Since that time, the research farm has expanded to

390 acres and now includes a field research centre, seed dryers, a field laboratory and storage facility, and seed cleaning and growth facilities.

It wasn't until the fall of 1992 that staff and researchers moved to the new location in downtown Lacombe, although the new Field Crop Development Centre didn't officially open until January 1993. At that time, barley breeding projects in Beaverlodge and Lethbridge were discontinued, and R.I. Wolfe, the projects' lead, moved to Lacombe, bringing with him his breeding material. The move sparked the idea for a new project — the development of two-row malting varieties for Alberta. As a result, the first malting potential lines went into yield trials in 1995.

Since its beginnings, numerous experts have joined the Lacombe team, including research agronomists, plant pathologists and weed scientists. This past summer marks the 40th anniversary of the breeding program in Lacombe. The program is still headed by Helm.

"I've been very lucky to hire some really dedicated staff," says Helm. "Many of them have been with me for 30 years or more and that's unusual."

Research Projects

Research projects at FCDC focus on the development of cereal crops — specifically barley, spring and winter triticale, and winter wheat — through a variety of methods, including plant breeding and molecular, physiological and agronomic research. Specifically, cereal research projects are carried out in barley development, triticale development, agronomy, cereal pathology, screening and genetics, and co-operative testing.

Helm says that there's something that sets FCDC apart from similar programs. "I don't think I could have done what I have done in any other place," he says. "Being able to move to Lacombe and build a research station from scratch would never have been possible with Agriculture and Agri-Food Canada or the University of Alberta. Here, I was able to build it the way I wanted it, and that's what kept me going."

"To me, the highlight has been our ability to focus on producing varieties," he continues. "In Alberta, for example, we had 3.7 million acres of barley production in 2012, and 1.752 million of those acres were in our varieties. The value of our varieties in tonnes using an average was 47.67 per cent of production in just Alberta alone. That's over $624 million going into the pockets of farmers. That's the highlight for me. Not bad for a $2-million input."

Over the past 40 years, FCDC has developed some 40 new varieties: 30 barley varieties, five spring triticale varieties, four winter triticale varieties and one winter wheat variety. Four of the newer varieties include two that were registered just this year, Amisk and Canmore (both barley), as well as Metzger, a winter triticale variety developed in 2008, and Pintail, the only winter wheat variety, developed in 2010.

"The winter wheat is basically there to make better triticales," explains Helm. "We use the winter wheat to bring genetic variability into the crosses and to improve things like earliness and straw strength, plant height and disease resistance. So it's a germplasm development program in the winter wheat area for better hardiness and better agronomics, and then we cross it in to make better triticales."

Seeding at the Field Crop Development Centre

Workers harvest the plots at the Field Crop Development Centre

FCDC summer field tour

Photos courtesy of the Field Crop Development Centre

Helm says that yield averages for the varieties are more than double the province's average of 60 bushels per acre. Higher yields are due, in part, to disease resistance and strong straw.

On the triticale side of things, FCDC is taking about 90 per cent of the production in Alberta, says Helm. In total, there were 10 triticale varieties in production in 2012, both winter and spring together. "Three out of the four winters were from here," says Helm. "And four out of six of the springs were from FCDC. So we take a big chunk of the production."

In that same year, there were 40 different barley varieties in production; 14 were from Lacombe, 12 were from Brandon, eight from Saskatoon, and the remaining six were from breeding organizations located outside of the country.

Helm attributes some of the program's success to international connections he's made over the years. The genetics for many of the varieties they developed have come from all over the world, particularly those bred for disease resistance.

Looking Forward

Helm has been working with Flavio Capettini, head of research, Alberta Agriculture and Rural Development, Feed Crops Branch, since he was a breeder in Mexico and Syria in 2000. Together, they have been pyramiding genes for resistance and collaboratively testing genetics in about six different countries. Once Helm retires, Capettini will be taking up the torch and moving the program forward.

"Dr. Capettini is new here, but he's already right into the program. A lot of the crosses he's made have been used in our crosses to develop new varieties," says Helm. "The really good disease resistance we're getting into our barleys and our triticales is because of that international connection — going all the way back to when I was 19 years old and Dr. Borlaug got a hold of me."

For his part, Capettini says it's going to be a difficult challenge to continue what Helm has started with the same level of success. But he's more than willing to take on the challenge.

"The program has been pretty successful in introducing improved varieties of barley, wheat and triticale in the last few years," says Capettini. "That makes it a little more challenging. As in, how can we continue to improve on that in the near future? You have to think that every change you see made in the breeding programs, you see the results in 10 to 15 years. Having said that, I think there is room to make some changes to the program that will continue to make it competitive in the market."

In particular, Capettini says Canada, especially Alberta, has room for increased barley production. It's expected the demand for malting barley will rise in coming years. Also, because the Alberta Barley Commission has done such a great job of promoting food barley, there has also been increased demand in that area.

Capettini has been working with barley since 1988 and brings a wealth of knowledge and experience to the FCDC. "I've had a chance to see a lot of different environments," he says. "And I try to use what I've learned to do better in my job." **Melanie Epp**

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IT STARTS WITH the seed. Every bag of certified seed you plant is an investment in you, the Canadian farmer. That's because when you choose certified seed, you're not just getting a proven, quality product — you're putting money back into the research and development of new and advanced seed varieties.

Seed is the foundation of the agriculture and agri-food value chain, an industry that in 2010 was responsible for more than $35.5 billion in exports and $28 billion in imports, and also directly provided one in eight Canadian jobs, employed two million people and accounted for 8.1 per cent of Canada's GDP. Exports of seed alone are valued at over $250 million annually, reaching customers in nearly 70 countries. Currently in Canada, there are 2,300 varieties of 50 different crop kinds of pedigreed seed grown on 1.2 million acres each year.

For agriculture and the agri-food value chain to flourish, the seed sector must be strong, responsive and innovative — everything and everyone depends on the crops we grow. Productive crops start from the seed that is planted. To safeguard the future of the seed industry, it is essential to adequately fund private and public plant breeding.

In order to drive innovation, the increased use of certified seed is essential to the future of the industry. Investment resulting from the use of certified seed leads to plant breeding breakthroughs, such as the introduction of new varieties that are higher yielding, more tolerant to disease and climatic variation, and provide more desirable characteristics for processors.

Certified seed offers real, tangible and significant benefits to the entire value chain. In addition to being an agent for innovation, certified seed represents a process of quality control, traceability and reliability. Certified seed is the right value capture tool for the seed industry.

Why Certified Seed?

Identity Preservation — Canadian producers can generate additional crop value based on identity preservation of specific desirable traits that meet precise producer and consumer needs. It is not possible to have a verifiable identity preservation system today without first starting with certified seed. Certified seed is developed, grown and inspected under strict regulations to ensure identify preservation throughout the value chain.

Value Capture — In order to not only increase yield and productivity, but improve the characteristics of the crops produced for both processors and producers, there is a need to invest in seed innovation through a value capture system that reinvests value directly into the crop. Certified seed requires no collection infrastructure; it is a user-pay system in which the grower directly pays for the use of seed from the company responsible for the genetic innovation. Certified seed also eliminates the chance of misreporting and helps eliminate fraud while increasing innovation.

Quality and Reliability — Certified seed represents the highest in seed quality standards due to the strict procedures and guidelines that must be followed during production and processing. The goal of the certified seed system is to produce a clean, genetically pure and traceable seed supply that produces a homogeneous, uniform and traceable crop.

"In order to drive innovation, the increased use of certified seed is essential to the future of the industry."

– Patty Townsend

Risk Reduction — Certified seed reduces the risk associated with crop production. Seed with verifiable quality and homogeneity can reduce production-related risks. The ability to reduce risk is why the Quebec government currently requires the use of certified seed to qualify for crop insurance.

Market Access and Marketability — The need for certified seed is increasingly becoming a requirement in global markets where consistency, end-use specific traits and contractual identity preservation are prerequisites. As quality management, tracing, tracking and varietal identification become more important in international trade negotiations, the quality management systems associated with certified seed production will positively impact the global trade of seed and grain. **Patty Townsend**

Editor's Note: Patty Townsend is the president of the Canadian Seed Trade Association.

WHERE ON THE WEB

For more information about the importance of certified seed and the seed industry, please visit **seedforthefuture.ca**.

DUPONT
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The *Alberta Seed Guide* New Varieties List is your heads up to what will soon be available in a field near you.

Some varieties may only be available in limited supply, so make sure you call your local representative for more information. The companies that were asked to supply information are responsible for any claims contained within the list. Always remember that variety performance may vary from region to region. Visit seed.ab.ca for company links.

abbreviations

PEST RESISTANCE:
R - Resistant
MR - Moderately Resistant
I - Intermediate
MS - Moderately Susceptible
S - Susceptible

TRAITS:
Bt - ECB Resistant
HXI - Herculex I
YGCB - YieldGard Corn Borer
CL - Clearfield Production System
GENRR - Genuity RR
GENRR2Y-Genuity RR2 Yield
GENVT2P - Genuity VT Double PRO
GENVT3P - Genuity VT Triple PRO
GT - Glyphosate Tolerant
LL - Liberty Link
RIB - Refuge in a Bag
RR - Roundup Ready
RR2 - Roundup Ready 2
RR2Y - Roundup Ready 2 Yield
VT2 - YieldGard VT Double
VT3P - YieldGard VT Triple PRO

PESTS:
ECB - European Corn Borer
FHB - Fusarium Head Blight
PRR - Phytophthora Root Rot
SCN - Soybean Cyst Nematode

OTHER:
HU - Heat Units

WHEAT:
CPS - Canada Prairie Spring
CWHWS - Canada Western Hard White Spring
CWRS - Canada Western Red Spring
CWRW - Canada Western Red Winter

ALFALFA

ALFALFA

Company		Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Proven Seed	CPS (Canada) Inc. Ph: (306) 569-5207 cpsagu.ca	VT Total						
DuPont Pioneer	Dupont Pioneer Ph: (306) 385-3001 Pioneer.com/ Canada	55v50						3% yield advantage over Pioneer brand alfalfa 55V48 High resistance ratings for Phytophthora and Aphanomyces race 1 & 2 High overall root rot resistance
Northstar Seed Ltd	Northstar Seed Ph: (800) 805-0765 NorthstarSeed.com	Rugged ST						Improved germination under salt stress Very good winter hardiness, deep-set crowns Excellent disease resistance
		TH2						Very good winter hardiness Multifoliate variety
PICKSEED	Pickseed Ph: (800) 265-3925 Pickseed.com	Assalt ST					HR to all six major alfalfa diseases	Variety screen for tolerance to salt water and high pH soils Very good winter hardiness Assalt ST has an adaptabililty advantage to a range of locations and conditions

CANOLA

CANOLA

Company		Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Bayer CropScience	Bayer CropScience Ph: (888) 283-6847 BayerCropScience.ca	InVigor L140P	*napus* Hybrid LL	-.5 days of InVigor 5440 and 45H29	100% of InVigor 5440 and 45H29	Very Good	R - Blackleg	The patented pod shatter reduction technology of InVigor L140P offers growers excellent yield protection with greater harvest flexibility Available in limited quantities for 2014
		InVigor L160S	*napus* Hybrid LL	-2 days of InVigor 5440 and 45H29	97% of InVigor 5440 and 45H29	Very Good	R - Blackleg	Your first line of defence against sclerotinia, InVigor L160S provides valuable sclerotinia protection with all the benefits of the LL system and the yield potential of and InVigor
		InVigor L252	*napus* Hybrid LL	-1 days of InVigor 5440 and 45H29	110% of InVigor 5440 and 45H29	Very Good	R - Blackleg	The top performer at the 2012 WCC/RRC trials, mid-season hybrid that offers growers high yield performance, enhanced standability and superior blackleg resistance
		InVigor L261	*napus* Hybrid LL	-2 days of InVigor 5440 and 45H29	107% of InVigor 5440 and 45H29	Very Good	R - Blackleg	Mid-maturing InVigor L261 yielded 107% of the new checks and delivers superior blackleg resistance and standability you can count on.
BrettYoung	BrettYoung Ph: (800) 665-5015 BrettYoung.ca	6044 RR	*napus* Hybrid RR	+.5 days of 46A65 and Q2	132% of 45A65 and Q2	Excellent	R - Blackleg R - Fusarium Wilt	A new mid to early maturity RR hybrid with great yields Excellent standability and harvestability Adapted to all canola production areas of Western Canada
Cargill	Cargill Ph: (888) 855-8558 CargillSpecialtyCanola.com	VICTORY V12-2	*napus* Hybrid GENRR	+1 day of 46A65 and Q2	103% of V12-1 in MSZ	Excellent	R - Blackleg R - Fusarium Wilt	New high-yielding, GENRR hybrid Industry-leading multi-genic blackleg package with exceptional standability Part of the 2014 Cargill Specialty Canola Program that delivers higher yields and returns in a simple program - visit cargillspecialtycanola.com for more info.
Proven Seed	CPS (Canada) Inc. Ph: (306) 569-5207 cpsagu.ca	Proven VR 9561 GS	*napus* Hybrid GENRR	+1 day of Proven VR 9557 GS	102% of Proven VR 9557 GS	Very Good	R - Blackleg R - Fusarium Wilt R - Sclerotinia	Sclerotinia could cost you $20-30/ac and every year growers are losing 2-3 or more bushels of canola. With unpredictable rain at flowering, infection can occur. Proven VR 9561 GS is your first line of defence against infection

Company		Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Proven Seed	CPS (Canada) Inc. Ph: (306) 569-5207 cpsagu.ca	Proven VR 9562 GC	*napus* Hybrid GENRR	Equal to InVigor L130	104% of InVigor L130	Very Good	R - Blackleg R - Fusarium Wilt R - Clubroot	Your most productive land deserves the most productive canola hybrid Proven VR 9562 GC has exceptionally high yield potential and excellent standability
		Proven VT 530 G	*napus* Hybrid GENRR	-.8 days of Proven VR 9559 G	Equal to Proven VR 9559 G	Excellent	MR - Blackleg R - Fusarium Wilt	Top yielding Genuity RR hybrid Medium maturity and excellent standability make it easy to put more bushels in the bin
		XCEED VT X121 CL	*juncea* Hybrid CL	-1 day of VT Oasis CL	125% of VT Oasis CL	Very Good	R - Blackleg R - Fusarium Wilt	Bred specifically for the brown and dark brown soil zones Better heat and drought tolerance for consistent performance, reduced green seed, improved seed quality and higher performance Improved pod shatter resistance for straight cut performance
DEKALB MONSANTO	Monsanto Canada Inc Ph: (888) 667-4944 DEKALB.ca	DEKALB 74-54 RR	*napus* Hybrid GENRR	-1.1 day of 45H29	104.3% of 45H29	Good	R - Blackleg R - Fusarium Wilt R - Clubroot	DEKALB brand's newest broad acre product with consistent high yield potential Ideal plant height, and excellent harvestability Good standability
syngenta	Syngenta Canada Inc. Ph: (888) 368-4211 Syngentafarm.ca	SY4114	*napus* Hybrid GT	+.9 days of 73-45 (22 sites) -.7 days of 45H29 (14 sites)	104% of 73-45 (22 sites) 99% of 45H29 (14 sites)	Good	R - Blackleg	Mid-season variety that performs well across all growing zones in Western Canada
		SY4135	*napus* Hybrid GT	+.5 days of 73-45 (33 sites) -1.7 days of 45H29 (35 sites)	105% of 45H209 (33 sites) 99% days of 73-45 (35 sites)	Very Good	R - Blackleg	Mid-season variety that fits and performs well across all growing zones in Western Canada

CORN

Company		Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Elite BrettYoung	BrettYoung Ph: (800) 665-5015 BrettYoung.ca	E47A12 R	Food/Feed Hybrid GENVT2P RIB	2225 HU	Excellent		R - ECB	E47A12 R delivers the same genetics as E47A17 R but with VT2P RIB to deliver corn borer protection without the hassle of planting a separate refuge
		E47A17 R	Food/Feed Hybrid RR2	2200 HU	Excellent			A top performer for yield and drydown E47A17 R provides fast emergence and early maturity with good grain drydown and bushel weight
		E48A27 R	Food/Feed Hybrid RR2	2250 HU	Excellent			A top-yielding grain hybrid with excellent drydown in a medium maturity hybrid
		E48A29 R	Food/Feed Hybrid GENVT3P RIB	2300 HU	Excellent		R - ECB	E48A29 R delivers the same top yield and drydown as E48A27 R with the superior ECB protection provided by the Genuity VT Triple PRO RIB complete trait
		E53B22 R	Silage Hybrid VT2 RIB	2350 HU	Excellent		R - ECB	A new hybrid that delivers outstanding yield coupled with excellent plant health in both silage and grazing conditions Tall hybrid with excellent spring vigour for the 2200-2500 HU areas
DUPONT PIONEER	DuPont Pioneer Ph: (306) 385-3001 Pioneer.com/Canada	P7632R	Grain/Silage RR2	2150 HU	Outstanding			Outstanding yield for early maturity corn Very good drought tolerance Above-average stalk and root strength Good husk cover
		P7632HR	Grain/Silage HX1, LL, RR2	2200 HU	Excellent			Very good drought tolerance Above-average stalk and root strength Good husk cover, excellent yield for early maturity corn
		P8016AM	Grain/Silage AM, HX1, LL, RR2, YGCB	2350 HU	Excellent		MR - Goss's Wilt	Optimum AcreMax product delivering integrated refuge for above-ground insect control Very good drought tolerance and strong root strength, excellent yield for early maturity corn Average grain dry down
DEKALB MONSANTO	Monsanto Canada Inc Ph: (800) 667-4944 DEKALB.ca	DKC26-18	Food/Feed/ Silage Hybrid GENVT2P	2150 HU	Excellent		R - ECB R - Corn Earworm R - Fall Armyworm	Excellent top-end yield potential. Dual purpose grain and silage product for early RMs Excellent staygreen and plant health
		DKC30-07	Food/Feed/ Silage Hybrid GENVT2P	2325 HU	Excellent		R - ECB R - Corn Earworm R - Fall Armyworm	Excellent yield potential Medium-tall hybrid with excellent harvest appearance. Excellent emergence and seedling vigour. Strong ratings for test weight, drydown and drought tolerance
PICKSEED	Pickseed Ph: (800) 265-3925 Pickseed.com	PS 2305VT3P RIB	Feed/ Silage Hybrid GENVT3P RIB	2250 HU	Very Good		R - ECB and Southern Corn Borer R - Corn Earworm, Fall Armyworm R - Northern and Western Corn Rootworm	Stacked trait technology - Genuity VT Triple PRO RIB Complete version of 2304RR Good disease package with very good grain quality Tall plant height with extremely fast drydown
		PS 2348VT2P RIB	Feed/ Silage Hybrid GENVT2P RIB	2275 HU	Excellent		R - ECB and Southern Corn Borer R - Corn Earworm, Fall Armyworm	Stacked trait technology - Genuity VT Triple PRO RIB Complete, best performance as a full-season hybrid. Nice grain quality and harvest appearance in a medium-tall plant. Very good stalks and greensnap tolerance, very good tolerance to drought and northern leaf blight
		PS ExLeafy VT2P RIB	Feed/ Silage Hybrid GENVT2P RIB	2575-2675 HU	Excellent		R - ECB and Southern Corn Borer R - Corn Earworm, Fall Armyworm	Stacked trait technology - Genuity VT Triple PRO RIB Complete version of PS ExLeafy RR, Leafy trait hybrid. Very good root and stalk strength, very tall plant height. Good emergence and early season development, white cob
		PS SilEx VT3P RIB	Feed/ Silage Hybrid GENVT3P RIB	2250 HU	Excellent		R - ECB and Southern Corn Borer R - Corn Earworm, Fall Armyworm R - Northern and Western Corn Rootworm	Stacked trait technology - Genuity VT Triple PRO RIB Complete Grain and high-performace silage, high test weight Very good stalk strength, very tall plant height

PRIDE SEEDS	PRIDE Seeds Ph: (800) 265-5280 Prideseed.com	A4023BtRR	Feed/ Silage Hybrid RR, YGCB	2125 HU	Excellent		R - ECB	Early flowering and very rapid finish Strong agronomics with excellent spring vigour, stalk strength and full grain dent Very good health and disease tolerance, superior late season intactness and ease of harvest
		A4176BtRR	Feed/Silage Hybrid RR, YGCB	2000-2200 HU			R - ECB	Proven silage quality and excellent high moisture corn choice White cob with high energy yield and digestibility Exceptional emergence and spring vigour for early maturity zones, early flower and finish
		A4408G2 RIB	Feed/Silage Hybrid RR, GEN-VT2P	2200 HU	Excellent		R - ECB R - Corn Earworm R - Fall Armyworm	New very exciting early high-performance yield, refuge in a bag for automatic refuge compliance Exceptional stalks and roots, high consistency for grain yield with very good silage potential Superb health and drought tolerance as well as outstanding emergence and seedling vigour
		A4631G2 RIB	Feed/ Silage Hybrid RR, GEN-VT2P	2300 HU	Excellent		R - ECB R - Corn Earworm R - Fall Armyworm	Exceptional late season standability and intactness, refuge in a bag for automatic refuge compliance Early dented grain or silage hybrid, excellent grain quality and ease of harvest Excellent health and disease tolerance
		A4705HMRR	Feed/ Silage Hybrid RR	2225-2375 HU	Excellent			Benchmark product for silage, grazing and high moisture corn growers Excellent grazing use with high yield and nutrition with strong stalks. Slow drydown for wide harvest window Unbeatable and consistent output year after year. White cob and very good starch levels provide excellent silage quality
		A5004G2 RIB	Feed/ Silage Hybrid RR, GEN-VT2P	2200 - 2350 HU	Excellent		R - ECB R - Corn Earworm R - Fall Armyworm	Solid agronomic package including standability, drought and disease tolerance, refuge in a bag for automatic refuge compliance Excellent intactness, stalk strength and health Very good digestability and tonnage Attractive fall appearance with very good silage characteristics
		AS1047RR EDF	Feed/ Silage Hybrid RR	2275-2450 HU	Excellent			Undeniable performance for high moisture corn use and silage feed. Very tall plant with girthy ears that produce flint kernels on a white cob Effective digestible fibre hybrid with excellent silage characteristics, yield and starch per acre Slow grain drying rate preserves reliable and consistent feed quality and correct grain high moisture content

FLAX

FLAX

Company	Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Proven Seed CPS (Canada) Inc. Ph: (306) 569-5207 cpsagu.ca	WestLin 70	Brown	+3 days of CDC Bethune	102% of CDC Bethune	Very Good		Traditional brown flax variety available through Proven Seed growers in 2014 Same great in field yield performance as CDC Bethune with larger seed size and high protein, plus oil and iodine values, which is attractive to end-use buyers
	WestLin 71	Brown	+1 day of CDC Bethune	103% of CDC Bethune	Excellent		Traditional brown flax variety available through CPS (Canada) Inc. in 2014 WestLin 71 offers improved yield and standability over CDC Bethune Reduced plant height helps with straw management

SOYBEANS

SOYBEANS

Company	Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
DuPont Pioneer Ph: (306) 385-3001 Pioneer.com/ Canada	P001T34R	Brown RR	2350 HU	Excellent	Very Good		Ultra early maturity, earlier than 900Y61 Very good early growth and harvest standability Average canopy width, very strong iron chlorosis
	P002T04R	Tan RR	2350 HU	Outstanding	Excellent	R-PRR	Ultra early maturity, earlier than 900Y61 Excellent early growth scores and harvest standability Built in Phytophthora resistance (Phytophthora gene 1k), good iron chlorosis
DEKALB MONSANTO Monsanto Canada Inc Ph: (800) 667-4944 DEKALB.ca	23-60RY	Black GENRR2Y	2375 HU	Excellent	Very Good	R - PRR Good White Mould Tolerance	Excellent emergence Tall product that stands well Good white mould tolerance

SOYBEANS

Company	Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Monsanto Canada Inc Ph: (800) 667-4944 DEKALB.ca	24-61RY	Black GENRR2Y	2475 HU	Excellent	Very Good to Excellent	R - PRR R - Brown Stem Rot Good White Mould Tolerance	Medium-tall plant Excellent resistance to white mould and brown stem rot Strong tolerance to Phytophthora root rot
PRIDE Seeds Ph: (800) 265-5280 prideseed.com	PS 0035 NR2	Black GENRR2Y	2375 HU	Excellent	Excellent	R - SCN	New, exciting early season, high yielding RR2 variety Great combination of strong SCN tolerance and above-average IDC tolerance Excellent standability and disease resistance Consistent variety for early and mid-season growing areas

WHEAT

Company	Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Alliance Seed Corporation Ph: (877) 270-2890 AllianceSeed.com	AAC Iceberg	CWHWS Spring	+2 days of CDC Teal	105% of CDC Teal	Very Good	R - Leaf Rust MR - Stem Rust, Loose Smut, Common Bunt MS - FHB	High yielding, short and strong strawed hard white spring wheat variety that has an improved disease package compared to Snowbird and Snowstar Significantly high seed mass and higher grain protien content compared to Snowstar Available through an IP contract for 2014 through ASC stakeholders
Canterra Seeds Ph: (866) 744-4321 canterra.com	AAC Bailey	CWRS Spring Milling	-2 days AC Barrie	106% of AC Barrie	Good	R - Stem Rust, Leaf Rust MR - Stripe Rust I - FHB	Excellent fit for short growing zones
	Emerson	CWRW Winter Milling	+3 days of CDC Falcon	100% of CDC Falcon	Very Good	R - FHB, Stem Rust, Stripe Rust I - Leaf Rust	A game changer variety with excellent disease resistance and milling quality The first wheat with a R rating for fusarium head blight
CPS (Canada) Inc. Ph: (306) 569-5207 cpsagu.ca	CDC Thrive	CWRS Spring, Milling CL	+.3 days of AC Barrie	112% of AC Barrie	Good	MR - Stem Rust I - Leaf Rust, Stripe Rust MS - FHB	Good yield, high protein and early harvest combine with Clearfield tolerance to give CWRS growers maximum market return, while minimizing environmental loss

WHEAT

WHEAT

Company		Variety	Crop Type	Maturity	Yield	Standability	Pest Resistance	Specialty Features
Proven Seed	CPS (Canada) Inc. Ph: (306) 569-5207 cpsagu.ca	CDC VR Morris	CWRS Spring Milling	-1.4 days of AC Barrie	117% of AC Barrie	Very Good	MR - Leaf Spot, Stem Rust, Leaf Rust, FHB	There's new leader in performance! Proven CDC VR Morris takes top spot in performance checks With Proven CDC VR Morris you can have both yield and strong FHB resistance
Mastin Seeds	Mastin Seeds Ph: (403) 556-2609 MastinSeeds.com	Pintail	Winter Feed	-1 day of Radiant	104% of all purpose checks	Very Good	R - Stripe Rust MR - Leaf Spot, Powdery Mildew, Stem and Leaf Rust S - FHB	Very good winter hardiness Awnless spike
syngenta	Syngenta Canada Ph: 800-756-SEED Syngentafarm.ca	SY433	CWRS Spring	+1 day of Unity VB	101% of AC Barrie	Very Good	R - Stem Rust, Leaf Rust, Common Bunt, Loose Smut MR - FHB	Hollow stemmed, awned wheat, producing consistent, high-quality grain Good protein, very good for baking, good milling yields with acceptable flour colour. Excellent PPO levels and makes good noodles for export markets Complete disease package

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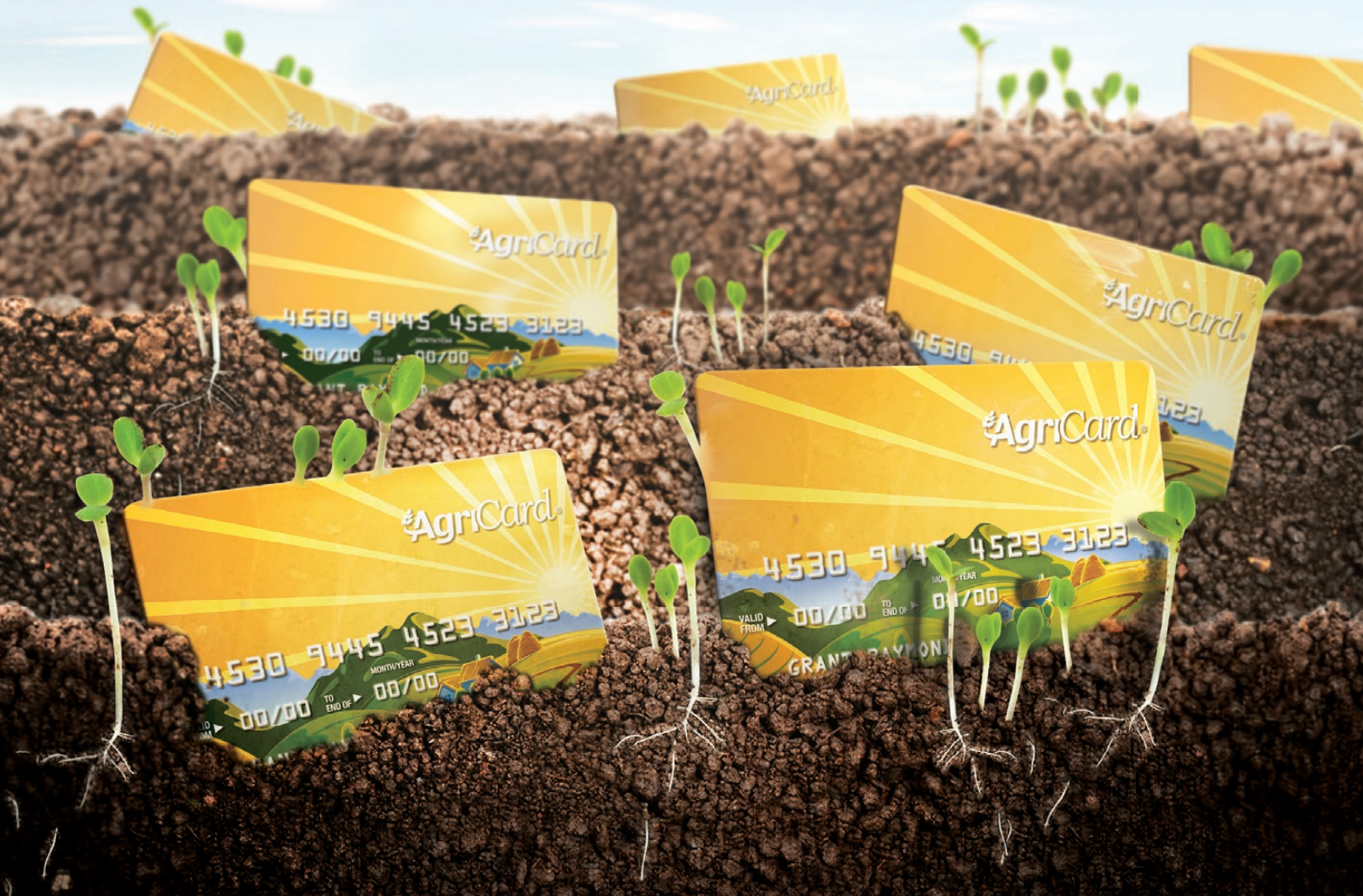

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PICK OF THE CROP

The Prairie Grain Development Committee and the Western Canada Canola/Rapeseed Recommending Committee's newly-approved varieties showcase the growth and innovation taking place in the industry.

EACH FEBRUARY, THE Prairie Grain Development Committee facilitates a forum on the development of improved crop cultivars for the Canadian Prairies. At the meeting, scientific discussions, research priorities, the status of co-op testing sites, committee happenings and the 2013 new varieties selections took place.

The PGDC consists of four independent recommending committees for Wheat, Rye and Triticale (PRCWRT), Pulses and Special Crops (PRCPSC), Oat and Barley (PRCOB) and Oilseeds (PRCO), which are responsible for overseeing the testing, evaluation and recommending of candidate cultivars for registration.

Vigilance in selecting the best candidates for Canadian growers and fostering the industry's evolution were the themes of the opening address by PGDC chair, Erin Armstrong. "The theme for this year's session is the evolution of variety evaluation and registration. The reason that this topic was chosen this year is because of all the change that is happening around us—changes in agriculture, definitely in Western Canada, but it also extends beyond that. We've got changes happening in the marketing system, within the commercial world, regulatory changes, changes in public relations, in Agriculture [and Agri-Food] Canada, the Grain Commission and changes in the private market as well," said Armstrong.

"Our main objective is to ensure that the varieties that are released don't cause harm. Right now, we are at a time where everything is changing. With respect to what we are doing here this week, no change is not an option. With everything changing around us, we need to take a look at what we are doing and how we do it, and how to keep it relevant to what we need to accomplish."

High Yield and Improved Resistance: Wheat, Rye and Triticale

The PRCWRT approved 18 cultivars for registration, including the following:

- four Canada Western Red Spring varieties;
- one Canada Western Hard White Wheat variety;
- four Canada Prairie Spring Red;
- three Canada Western General Purpose; and
- two spring triticales.

In addition, one winter wheat cultivar was supported for the Canada Western Red Winter milling class. A Canada Western Amber Durum, DT570, expressing a solid-stem, which provides resistance to the wheat stem sawfly, was supported for interim registration.

Highlights of the newly-approved varieties include increased yield potential, improved quality, early maturity, improved

disease resistance and resistance to the orange wheat blossom midge.

DT833, a CWAD cultivar, carries Sm1, which confers resistance against orange wheat blossom midge. This is the first supported durum wheat cultivar expressing this trait.

The majority of the recommended CPS cultivars have improved yield and fusarium head blight resistance. PT584 was supported for the CWRS class, combining high yield with FHB and stripe rust resistance.

"If I speak in general, and not just what I am looking for specifically, then the biggest thing is milling extraction or yield—we want to make money," said Sheilagh Arney, Canadian technical director for ADM Milling Co. and PRCWRT committee member.

The PRCWRT also discussed the co-ordination of its co-op trials and the difficulties managing some led by the AAFC's Cereal Research Centre, as budget reductions have diminished the capacity to co-ordinate some co-op trials moving forward. Alternatives to an AAFC-led co-op, such as fee-for-service private co-op testing, transitioning affected co-ops to universities or private companies to co-ordinate, or combining test regions, were considered. "At the conclusion of the meetings, we had enough options on the table. We are currently facilitating those now to ensure that participants requiring generation of merit data will have a solution prior to spring seeding," said Brian Beres, PRCWRT committee chair.

Top-Notch Tolerance: Pulses and Special Crops

The PRCPSC recommended 16 varieties for registration. Among them were four dry bean varieties, five field peas, one faba bean, five new lentil varieties and an annual canary grass developed by the Crop Development Centre at the University of Saskatchewan.

Of the four dry beans developed, two were high-yielding varieties presented by Agriculture and Agri-Food Canada and best adapted for growing areas in southern Alberta and Saskatchewan. The other two approved varieties were also high-yielding varieties developed by the University of Saskatchewan and best for the growing regions of eastern Saskatchewan and western Manitoba.

Four of the five recommended field pea varieties are yellow cotyledon, the fifth a green cotyledon. The University of Saskatchewan and AAFC each developed two of these varieties, while one of the yellow cotyledon field peas, LN 4228, featuring good lodging resistance and protein content, was developed by Limagrain Nederland BV, based in the Netherlands. All varieties are resistant to powdery mildew.

The lone approved faba bean is small-seeded, offers some shattering resistance, was developed for a green manure and/or bird feed market, and has some ascochyta resistance. It was developed by the University of Saskatchewan.

Five lentil varieties were recommended, four of the red cotyledon variety and one green cotyledon, all developed by the University of Saskatchewan. IBC 597 is the world's first large red cotyledon lentil with imidazolinone tolerance and IBC 586 is the world's first green cotyledon with imidazolinone tolerance.

Focus on Resistance: Oats and Barley

The PRCOB approved nine different varieties: three oat milling, one six-row general purpose barley, four two-row malt barley and one two-row hull-less barley. Many of these newly-approved varieties possess similar attributes including plump kernels and resistance to root rot, spot blotch, stem rust and smut.

"The theme for this year's session is the evolution of variety evaluation and registration. The reason that this topic was chosen this year is because of all the change that is happening around us—changes in agriculture, definitely in Western Canada, but it also extends beyond that."

– Erin Armstrong

Highly-Valued Varieties: Oilseeds

The PRCO approved five new varieties for recommendation including two flax varieties developed by Viterra and a third flax variety developed by the Crop Development Centre at the University of Saskatchewan.

Two yellow mustard varieties developed by AAFC were also approved. One of them, YM08-YCMO, has high mucilage content, required by the wet miller. "This is of special value to the industry. It is anticipated that new market opportunities will be created for Canadian mustard since major customers have expressed keen interest in the level of mucilage," said Bifang Cheng, condiment mustard breeder at AAFC.

"We have had a 20 per cent drop in the number of entries into co-op testing, but this does not necessarily translate into the number of canola varieties marketed."

– Raymond Gadoua

New Technologies: Canola

The Western Canada Canola/Rapeseed Recommending Committee is a separate entity from the PGDC, but also held its meeting in February. A total of 61 *Brassica napus* candidate canola cultivars were recommended. Fifty-four full recommendations (35 Roundup Ready, 15 LibertyLink and four Clearfield cultivars) and seven interim recommendations (Roundup Ready) were made.

"Over the past two years, we have had a 20 per cent drop in the number of entries into co-op testing, but this does not necessarily translate into the number of canola varieties marketed," said Raymond Gadoua, co-ordinator and secretary of the WCC/RRC committee. "Significantly, this year we will see the entry of Pioneer Hi-Bred's new glyphosate technology cultivars into the WCC/RRC system as closed-loop public co-op trials."

The WCC/RRC members also decided to continue the funding of a project to standardize a methodology for sclerotinia ratings for the third year. In addition, new blackleg checks (isolines) will continue to be evaluated for the purposes of determining the type of blackleg infection at blackleg disease evaluation sites. Finally, a subcommittee to consider and advise on issues relating to canola quality was reconstituted with Brittany Dyck, CCC canola meal manager, as chair.

Letter Signals Changes Coming

Upon arrival at the PGDC conference, committee chairs received a letter from Agriculture Minister Gerry Ritz asking the committees to consider "all aspects of the workings of the committee to ensure an approach going forward that encourages innovation and variety development and balances the interest of producers and the entire value chain."

The minister referred to prairie grain handlers and how they've long complained the variety registration system is "slow and unable to adapt to the changing needs of the marketplace." Committees were asked to reassess and, if possible, reduce the "data requirements, number of years of pre-registration field trials and acceptability of foreign data if applicable," for the candidate cultivars they recommend.

Ritz has pledged to hold both formal and informal industry consultations over the next several months to "gather views on the current process and potential areas for regulatory change." "I would appreciate hearing back from members about the ideas and reforms that your committee is expecting to implement over the next year," said Ritz.

Conference leaders were unprepared for this call to action from the minister. "We were anticipating it based on the attention it had received [at the] CSTA meeting [in April 2012] that the PRCWRT participated in. It was the timing that was unexpected," said Beres.

Committee chair Brian Beres discusses the co-ordination of the PRCWRT's co-op trials.

More questions than answers were posed during committee discussions after the letter was received.

"Post-[Canadian] Wheat Board brought the focus [on] the variety registration system. There was a perception that with the wheat board gone there would be free movement of grains. And that's maybe why, in part, the minister sent his letter and why there is so much focus on the procedures," said Brian Lemon, CFIA's field crops division director.

With the impending overhaul of the variety registration process, only one thing is certain—this will be a time of change for the industry. However, the industry is ready to meet and overcome any challenges those changes may bring. "I can't comment for the other committees, but PRCWRT is up for the challenge, and it times nicely with our mandate to review our operating procedures, which is performed every three years and was due for review this year. I don't think anyone wants a system laden with layers of bureaucracy or regulations, but that also doesn't mean we should forego all checks and balances," says Beres.

Jen Golletz

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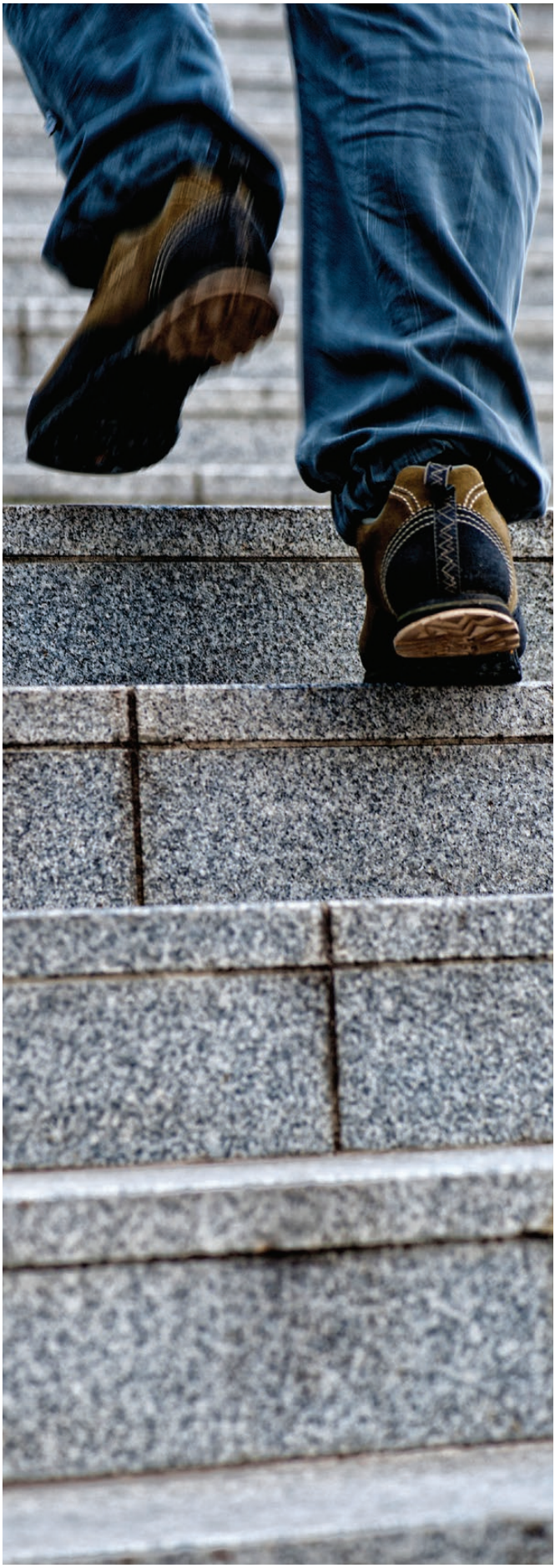

FIRST STEP TO SUCCESS

The one tool growers should always consider is a seed test.

SURPRISINGLY, SOME GROWERS skip the one inexpensive step that can set the tone for cropping success. When amortized over several hundred or even a thousand acres, the cost of a seed test for germination, vigour, 1,000 kernel weight (kwt) and disease presence can amount to mere pennies. Such tests can also mean considerable savings in crop protection costs — so why do some growers continue to scrimp on seed testing? The answer may lie in the lack of understanding of what a seed test can provide and how to make effective use of the information it generates.

"Insurance", "a confidence builder" and "invaluable knowledge" are some of the terms used to describe seed tests by those in the know. While Mother Nature is often a wild card in any crop production system, a seed test can inform a grower about the ability of the seed to withstand potential environmental challenges. It will also evaluate whether additional tools, such as seed treatments, are needed to ensure the crop has the best possible chance of growing successfully right from the very beginning.

"Good seed will always start the crop off right," says Sheri Strydhorst, an agronomy research scientist with Alberta Agriculture and Rural Development. "Good seed sets your yield potential."

The first and most important aspect of any seed test is the check for germination. "A germination test will give us the maximum potential for seedlings to develop into mature plants in a field," explains Morgan Webb, an accredited seed analyst with Seed Check Technologies in Leduc, Alta. "The higher the percentage, the better. For example, to achieve a Number 1 wheat, you need 85 per cent of normal good seed in a sample. For wheat, if the germination test is less than 85 per cent, it would be good to test for 1,000 kernel weight and adjust your seeding rate accordingly."

In addition to germination and 1,000 kwt, the third important aspect of testing is a vigour test to determine how well the seed will perform under stressful conditions. "Vigour shows the potential for development of normal, healthy seedlings under stressful conditions" Webb explains.

Most seed testing facilities will offer a package for germination, 1,000 kwt and vigour — the three basic tests any grower should consider getting done for seed they intend to use for

crop production. But beyond these there are numerous tests for disease, some of which are required by law, as well as tests for the presence of weeds. Some testing laboratories have set prices per test and will present a total cost once all the tests are ordered, while others offer packages of tests based on the most commonly requested.

"Testing seed should be part of any business management plan," says Trevor Nysetvold, president and CEO of BioVision in Edmonton, Alta. "In many ways, the results of a seed test are part of best management practices because good quality seed is the basis for a good return on all your investments in crop inputs. If you don't start with good seed, it doesn't matter what you do with fertilizer or pesticides."

Besides giving an accurate picture of how seed will perform in a field, a seed test also gives growers information that can lead to better overall crop production. A purity test will alert a grower to problems on the seed, such as a fungal infection. Having this information in hand will guide a grower towards wise management practices in-season.

A seed test helps a grower to evaluate if it is prudent to continue with a plan to use a particular lot of seed, explains Webb. "Getting seed tested is an affordable way to insure all your management will be successful because, if you use poor seed, all that effort will be wasted."

Kelly Turkington, a plant pathologist with Agriculture and Agri-Food Canada in Lacombe, Alta., says, "By testing seed, a grower has an idea of what pathogens are on the seed and if it would benefit from a seed treatment or if the seed should not be planted at all. The second reason to have your seed tested is to determine if the seed is a carrier of disease, such as *Fusarium graminearum*." This is because, *Fusarium graminearum* is listed under the pest act, and any seed with detectable levels may not be seeded. Turkington adds that knowing what the seed may be carrying by testing for weeds and diseases will help to mitigate problems for future crops as well.

Sarah Foster of 20/20 Seeds Labs in Nisku, Alta., maintains testing gives growers the opportunity to resolve potential problems with pathogens. "Our professional package will tell growers if the seed is healthy and viable and how vigorous it is," she says. "You can have great germination, but, if you don't know [if] there are diseases present, you could have big problems if the growing conditions are not good."

Foster says a comprehensive test can cost around $200, which is usually not that expensive when the total number of planted acres are taken into account. Most laboratories charge a similar amount, but it is a good idea to be clear with the technician about exactly what tests are required and what the end cost will be. If there is some information in the final report that requires clarification, Foster suggests asking to speak to the technician for further explanation. Test reports usually contain a comments section which Foster says can be the grower's greatest source of information. Most agronomists are also competent to assist with report interpretation and can help to make cropping decisions based on the information.

"Knowing everything about your seed is very important," says Foster. "Get every detail of the report explained, if needed."

Just having one seed test done is not enough, according to Nysetvold. "You need to develop a consistent seed testing regimen," he says. "You need to build a file over the years because you want data from your own farm to understand how your management is working. Often you will see you don't have a problem, but you want to make sure you don't get one and consistent seed testing will do that for you."

Webb says some growers have their seed sampled in the fall to determine if the seed is worth planting come spring. If it is not, there is the option to sell the crop and buy new seed. A sample that is given a good report is frequently tested again in the spring, he says, to ensure that winter storage has not reduced its quality.

"Testing seed should be part of any business management plan."

– Trevor Nysetvold

In addition to the danger of testing too infrequently, Strydhorst says growers often make the mistake of not using the seed test information effectively. "Use a seeding rate calculator once you have the 1,000 kwt and germination information," she says. "These are often underused tools. Many producers seed on a bushels per acre and don't do a seeding rate calculation."

Strydhorst says she has found seeding rates can differ between 2.4 to three bushels per acre for different wheat varieties when she has used the proper calculations. A certain number of plants are typically required per acre, in order to minimize competition from weeds and maximize yields, and it all comes down to simple calculations using information gleaned from a seed test.

Turkington maintains a seed test is just the beginning of good crop management, especially when it comes to disease management. "A seed test gives a grower information on what potential issues may affect the seed and gives an idea of what needs to be done to protect the crop," he explains.

"Knowing everything about your seed is very important... Get every detail of the report explained, if needed."

– Sarah Foster

Turkington says that shorter rotations lessen the importance of seed-borne infections introducing a disease, as the pathogen has already built up on the infested crop residues. Producers should also understand that it is perfectly normal for seed to carry a variety of fungi, both pathogens and saprophytes, he says, adding what is most important is the level of infection and what the pathogen is.

"Seed labs are the first line of defence in identifying potential problems with a crop," comments Foster. "Before you turn the key in your tractor, you should be confident in the quality of the seed you are putting in the seeder."

Nysetvold says seed testing not only help helps ensure better crops, but also benefits the producer's bottom line. "If you miss something because you didn't test and use poor quality seed, what is the cost of that?" he asks. "If you get a seed test early, you have a good chance to adjust your management. If you test often, you can determine patterns and establish a new strategy."

As the world moves closer to tracking systems that are capable of tracing a loaf of bread backwards from the store to the bakery to the miller to the field, a seed test is one insurance against the field where the grain came from being the cause of a problem. Many experts say a grower's cropping decisions are guesswork without a seed test. For this reason, using certified seed or a seed test can be considered wise investments that can alert growers to preventable problems.

Rosalie Tennison

Seed testing should be viewed as a form of insurance for your crop.

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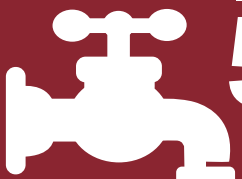

It takes **50,000** fewer gallons of **water** to grow an acre of corn today than in **1990**

The **BEEF INDUSTRY** contributes almost **$25 billion** to the Canadian economy annually

Spread the (good) word

Show your pride in agriculture. Click the Products tab at **shop.AgricultureMoreThanEver.ca**.
Prices are significantly below cost.

5-part magnet | $1

(5″ x 7″)

Get the conversation going with this expression of pride. Use as a single piece, or share with others.

Ball cap | $10

When you work in ag, you wear a lot of different hats. Fortunately, this may be the only one you really need.

T-shirt | $5

Wear your pride in comfort with a Gildan Ultra cotton t-shirt.

Free shipping (via Canada Post) anywhere in Canada.

Be our partner

If you're a supporter of ag too, consider becoming a partner. Visit **AgMoreThanEver.ca** to learn more.
We welcome ag retailers, producers, associations and organizations.

Be an AGvocate

Speak up, speak positively

Those of us involved in agriculture love what we do and we want the best for our industry. We know why agriculture is important to Canada and the world, and that it provides a lifestyle that can't be beat. But we tend to be a humble group, so others may not hear this message.

We need to remember: image matters. What we say about agriculture influences how people view our industry. Share your passion and optimism for agriculture and let it shine through everything you say and do – being an agvocate is that easy.

Agvocates look for opportunities to talk about what's going well in agriculture. They fill in information gaps, help dispel myths and learn more about the industry. Image is critical to our future, and fortunately we have a very positive story that we can tell. So let's tell it.

- Get young people excited. There are jobs – great jobs. There's farming of course, but many more options from science and sales to processing and manufacturing.
- Speak positively. Investment tends to flow to progressive industries that have a promising future.
- Inform consumers we're capable business managers and stewards of the land, driven to produce safe, high-quality food using sustainable methods.

Our image matters – in fact, it has never mattered more. Tell the world why you love agriculture and what the industry means to you. We're counting on you to tell the real, positive story of Canadian agriculture.

Agriculture
more than ever

Our industry needs more agvocates

To reach its **full potential**, agriculture needs everyone in the industry to speak up and speak positively.

Agriculture More Than Ever is an industry-driven cause to improve perceptions and create **positive dialogue** about Canadian ag. Together we can share the facts and stories about this vibrant and modern industry, and tell the world why we love what we do.

It's up to all of us to be **agvocates** and it's easier than you think – visit **AgMoreThanEver.ca** and find out how you can get involved.

Agriculture
more than ever

Alberta Seed Guide is a proud champion of this cause

Alberta and British Columbia Pedigreed Seed Growers
Directory of Varieties Produced in 2013

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)

BARLEY

	S	F	R	C
AC ALBRIGHT				
BI: AAFC (Lacombe), Dist: SeCan Members				
Wuthrich, David / Cecil Lake / (250) 781-3527				C
AC HARPER				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Feenstra, Lloyd / Barons / (403) 757-3737				C
AC LACOMBE				
BI: AAFC (Lacombe), Dist: SeCan Members				
Jones, Danny / Beaverlodge / (780) 354-8089				C
AC METCALFE				
BI: AAFC (Brandon), Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900				C
Crop Production Services Canada / Didsbury / (403) 335-3055				C
Dueck, Ralph E. & Brent / Olds / (403) 556-2602	S	F		
Eliason, Bruce W. / Wrentham / (403) 222-2258			R	C
Ellis, Brian / Olds / (403) 556-2890				C
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469				C
Holmen, Jonathan W. & Carson R. / Rosedale / (403) 823-9296				C
Kaun, Mark L. / Penhold / (403) 886-4562			R	C
King, Harold F. / Three Hills / (403) 443-7330			R	
Kopjar, Gerald M. / Rowley / (403) 368-2409				C
Lefsrud, Kevin J. & Edmund J. / Viking / (780) 336-2500				C
Limoges, Marcel / McLennan / (780) 324-3024				C
McNelly, Bevin / Clyde / (780) 348-5749			R	
Murray, Bruce / Lethbridge / (403) 327-9389				C
Nemetz, Charlie & Jerritt & Lewis & B. / Stettler / (403) 742-0436				C
Niemela, Raymond A. / Sylvan Lake / (403) 746-2645				C
Niemela, Terrance & Tracy / Sylvan Lake / (403) 746-2645				C
Oatway, Ward / Lacombe / (403) 784-3418				C
Penner, Larry / Three Hills / (403) 443-7212				C
Strain, Arthur George / Foremost / (403) 867-2227				C
Svanes, Ronald J. / Picture Butte / (403) 757-2108			R	C
Svean, Alan Carl & Scott / Rivercourse / (780) 745-2578				C
Wagner, Terry & Loree / Lacombe / (403) 782-2107			C	
AC RANGER				
BI: AAFC (Brandon), Dist: FP Genetics				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
BENTLEY				
BI: AAFRD, Dist: Canterra Seeds				
Cameron, Danny / Millet / (780) 387-5313	S		R	
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517			R	
Hundeby, Donald G. / Wetaskiwin / (780) 352-9992				C
Kaun, David E. / Penhold / (403) 886-4562				C
King, Harold F. / Three Hills / (403) 443-7330			R	
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322			R	
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358		F		C
Welsh, Donald Alan / Milk River / (403) 647-2228			R	
BUSBY				
BI: AAFRD, Dist: Mastin Seeds				
Anderson, Ken & Evelyn / Barrhead / (780) 674-5670			R	
Gibson, Donald / Sangudo / (780) 785-2214				C
Jones, Greg Thomas / Ponoka / (403) 783-6495				C
Mastin, Robert B. / Sundre / (403) 556-2609			R	
Smith, Gary W. / Eckville / (403) 746-5878				C
CANMORE				
BI: AARD, Dist: Canterra Seeds				
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358	S			
CDC ANDERSON				
BI: CDC, Dist: University of Saskatchewan				
Wagner, Terry & Loree / Lacombe / (403) 782-2107				C
CDC AUSTENSON				
BI: CDC, Dist: SeCan Members				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Benci, Dennis / Carmangay / (403) 643-2294				C
Card, Gordon B. / Magrath / (403) 758-3444			R	
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900		F		C
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151				C
Crop Production Services Canada / Didsbury / (403) 335-3055				C
Dallas, Bradley C. / Bowden / (403) 224-2162			R	
Dewindt, Harry & Renee / Thorhild / (780) 398-2377				C
Dyck, Heinz W. & Colin & Alan / Rosemary / (403) 378-3321	S	F		
Ellis, Brian / Olds / (403) 556-2890				C
Galloway, James D. & Peter / Fort Saskatchewan / (780) 998-3036				C
Gibson, Donald / Sangudo / (780) 785-2214			R	C
Hadland, Edward / Baldonnel / (250) 789-3646			R	
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469			R	C
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				C
Huvenaars, John & Lisa / Hays / (403) 725-2126				C
Jones, Greg Thomas / Ponoka / (403) 783-6495	S		R	
Kemp, Richard L. / Innisfail / (403) 227-4836				C
King, Harold F. / Three Hills / (403) 443-7330				C
Kopjar, Gerald M. / Rowley / (403) 368-2409			R	C
Kotowich, Paul & Dennis / St.Paul / (780) 645-2027				C
Limoges, Marcel / McLennan / (780) 324-3024			R	
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240				C
Mans, John / Nobleford / (403) 824-3585				C
Massey, Derwin / Stettler / (403) 883-2503			R	C
McDonald, Gerald / Cty. Of Grande Prairie No 1 / (780) 538-3868				C
McNelly, Bevin / Clyde / (780) 348-5749				C
Metzger, Don / Three Hills / (403) 572-3284			R	
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595	S	F	R	C
Nemetz, Charlie & Jerritt & Lewis & B. / Stettler / (403) 742-0436			R	
Niemela, Terrance & Tracy / Sylvan Lake / (403) 746-2645			R	C

Off-Types, Variants and Uniformity in Wheat Varieties

Farmers surveying their crops love to see uniformity in the plant stand.

It is important to understand that there are no varieties where the plant stand is uniform, or 'tabletop'. Producers taking just a quick glance of any plant stand will see that some plants are taller and some are shorter.

In the past virtually all CWRS varieties were awnless and tall. The variations were typically not observed in the tall varieties, mostly because no one (except perhaps breeders and other scientists) was looking for them. The introduction of new CWRS varieties with tall awned types and awned semi-dwarf varieties now increases the likelihood of noticing off-types and variants within varieties.

Variants within varieties are described in the variety descriptions. These variants are determined by the Breeder. For example, number of tall bearded plants (off-types) allowed in an awned semi-dwarf variety.

Producers appreciate the bonus of a semi-dwarf variety as it gives them high yields and standability. However with the shorter semi-dwarf variety the producer will be more likely to notice the tall variants (not tabletop).

AC® Muchmore CWRS is a semi-dwarf variety which has performed exceptionally well across Western Canada.

For more information about available semi-dwarf varieties contact your local FP Genetics shareholder or Territory Manager.

Why Certified Seed?
Because you want the best!

At FP Genetics our focus is the success of our customers. We strive to be first by being innovative to maintain our competitive edge in the market. By being innovative at our core, we bring the best in products and services, which brings value and profit to our seed growers and the commercial growers they serve.

Wheat - CWRS
CDC Utmost VB
AC® Muchmore
AC® Harvest

Durum - CWAD
AC® Transcend

Barley - 2 Row
AC® Newdale - Malt
CDC Thompson – Feed

Oats - Milling
CDC Ruffian
CDC Minstrel

Bringing Value and Profit to Canadian Farms

FPGenetics

Toll Free 1-866-228-6167 **www.fpgenetics.ca**

Oatway, Lori / Lacombe / (403) 784-3418		F	R	C
Penner, Larry / Three Hills / (403) 443-7212			R	
Persely, Edward & Shirley / Bonnyville / (780) 826-2992				C
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322			R	C
Shultz, Shawn / Didsbury / (403) 335-3694				C
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358				C
Stewart, E. Wilbur & Eldon / Big Valley / (403) 876-2784			R	
Templeton, Brant / Lethbridge / (403) 345-4124				C
Trueblood, Brian G. / Dapp / (780) 954-3745				C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253				C
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S	F	R	
Webber, Curtis / Stony Plain / (780) 963-6897				C
Weigum, Garry / Three Hills / (403) 443-2476				C
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928				C
CDC BATTLEFORD				
BI: CDC, Dist: SeCan Members				
Nisbet, Andrew E. & Diane E. / Bowden / (403) 224-3788		F		
Wagner, Terry & Loree / Lacombe / (403) 782-2107		F		
CDC COALITION				
BI: CDC, Dist: Canterra Seeds				
Bright, David / New Norway / (780) 855-2240				C
Cameron, Danny / Millet / (780) 387-5313	S	F		C
Cross, Douglas / Westlock / (780) 349-2587				C
Cyre, Clifford & Greg / Barrhead / (780) 349-4775			R	C
Galloway Seeds Ltd., James D. & Peter / Fort Saskatchewan / (780) 998-3036				C
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517			R	
Kaun, Mark L. / Penhold / (403) 886-4562			R	C
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240			R	C
Plante, Jacques / St. Paul / (780) 645-4604				C
Wuthrich, David / Cecil Lake / (250) 781-3527				C
CDC COPELAND				
BI: CDC, Dist: SeCan Members				
Bright, David / New Norway / (780) 855-2240				C
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900				C
Crop Production Services Canada / Didsbury / (403) 335-3055			R	C
Dueck, Ralph E. & Brent / Olds / (403) 556-2602	S	F	R	
Eliason, Bruce W. / Wrentham / (403) 222-2258			R	C
Goldstrom, David / Innisfail / (403) 227-2133				C
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929				C
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469			R	C

King, Harold F. / Three Hills / (403) 443-7330				C
Kittle, James W. & Andrew / Viking / (780) 336-2583				C
Kopjar, Gerald M. / Rowley / (403) 368-2409				C
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240				C
McNelly, Bevin / Clyde / (780) 348-5749			R	
Murray, Bruce / Lethbridge / (403) 327-9389				C
Niemela, Terrance & Tracy / Sylvan Lake / (403) 746-2645				C
Nisbet, Andrew E. & Diane E. / Bowden / (403) 224-3788		F	R	
Penner, Larry / Three Hills / (403) 443-7212				C
Selte, Donald / Vermilion / (780) 853-2484			R	C
Smith, Miles A. / Trochu / (403) 442-2693				C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253			R	C
Wagner, Terry & Loree / Lacombe / (403) 782-2107			R	C
Weigum, Garry / Three Hills / (403) 443-2476			R	
Zwack, Thomas / Daysland / (780) 374-2450				C
CDC COWBOY				
BI: CDC, Dist: SeCan Members				
Bright, David / New Norway / (780) 855-2240				C
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900				C
McNelly, Bevin / Clyde / (780) 348-5749				C
Meinczinger, Matthew Jr. / Busby / (780) 349-2456				C
Pare, Raymond A. / Wainwright / (780) 842-2073				C
Selte, Donald / Vermilion / (780) 853-2484	S			C
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617				C
Webber, Curtis / Stony Plain / (780) 963-6897				C
CDC KINDERSLEY				
BI: CDC, Dist: SeCan Members				
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929			R	
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469				C
Kittle, James W. & Andrew / Viking / (780) 336-2583				C
Knight, William & G. & Blaine & Craig & Brian / Tees / (403) 784-3633			R	
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240			R	
Niemela, Terrance & Tracy / Sylvan Lake / (403) 746-2645		F	R	C
Vipond, Grant / Didsbury / (403) 335-4376			R	
Weigum, Garry / Three Hills / (403) 443-2476				C
CDC MAVERICK				
BI: CDC, Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900			R	
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383	S		R	
Goldstrom, David / Innisfail / (403) 227-2133			R	

Hadland, Edward / Baldonnel / (250) 789-3646	S		R	
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929	S		R	
Kotowich, Paul & Dennis / St.Paul / (780) 645-2027			R	
Selte, Donald / Vermilion / (780) 853-2484		F		
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358	S		R	
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S	F	R	
CDC MEREDITH				
BI: CDC, Dist: SeCan Members				
Baier, Bill & Dean / Clyde / (780) 348-5791			R	
Benci, Dennis / Carmangay / (403) 643-2294				C
Crop Production Services Canada / Didsbury / (403) 335-3055			R	C
Davidson, E. Daryl & Dean / Kitscoty / (780) 846-2456			R	
Eliason, Bruce W. / Wrentham / (403) 222-2258				C
Ellis, Brian / Olds / (403) 556-2890				C
Goldstrom, David / Innisfail / (403) 227-2133			R	C
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929		F		
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469			R	
Harris, William P. & L. & Thomas & Alexander / Beaverlodge / (780) 354-2823	S	F		C
Kemp, Richard L. / Innisfail / (403) 227-4836				C
Klassen, Ken / Rosemary / (403) 378-4408				C
Knight, William & G. & Blaine & Craig & Brian / Tees / (403) 784-3633				C
Kopjar, Gerald M. / Rowley / (403) 368-2409				C
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240				C
Massey, Derwin / Stettler / (403) 883-2503				C
Mcdonald, Gerald / Cty. Of Grande Prairie No 1 / (780) 538-3868				C
Meding, Ernest / Trochu / (403) 442-2129				C
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595	S		R	
Niemela, Terrance & Tracy / Sylvan Lake / (403) 746-2645				C
Nisbet, Andrew E. & Diane E. / Bowden / (403) 224-3788	S	F	R	
Oatway, Grant / Lacombe / (403) 784-3418			R	C
Penner, Larry / Three Hills / (403) 443-7212				C
Selte, Donald / Vermilion / (780) 853-2484	S	F		C
Shultz, Shawn / Didsbury / (403) 335-3694				C
Vipond, Grant / Didsbury / (403) 335-4376				C
Wagner, Terry & Loree / Lacombe / (403) 782-2107				C
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434		F		C
CDC THOMPSON				
BI: CDC, Dist: FP Genetics				
Thompson, M. Ellwood & Kelly / Innisfail / (403) 728-3535				C
CDC TREY				
BI: CDC, Dist: FP Genetics				
Andersen, B. W. / Kitscoty / (780) 847-2022				C
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928	S		R	
CDC YORKTON				
BI: CDC, Dist: Canterra Seeds				
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322			R	
CERVEZA				
BI: AAFC (Brandon), Dist: Mastin Seeds				
Mastin, Robert B. / Sundre / (403) 556-2609			R	
Penner, Larry / Three Hills / (403) 443-7212			R	
CHAMPION				
BI: CPS (Canada) Inc., Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027				C
CHIGWELL				
BI: FCDC Lacombe, Dist: SeCan Members				
Crop Production Services Canada / Didsbury / (403) 335-3055				C
Feenstra, Lloyd / Barons / (403) 757-3737				C
Hadland, Edward / Baldonnel / (250) 789-3646				C
Thompson, M. Ellwood & Kelly / Innisfail / (403) 728-3535				C
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617		F		
Webber, Curtis / Stony Plain / (780) 963-6897				C
CONLON				
BI: NDSU, Dist: Seed Depot				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
DUKE				
BI: N/A, Dist: University of Saskatchewan				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
FALCON				
BI: AAF, Dist: N/A				
Stickland, Brian & Melvin G. & Irma / Red Deer / (403) 886-4875				C
GADSBY				
BI: AAFRD (Lacombe), Dist: SeCan Members				
Ohrn, Norman / Thorsby / (780) 985-2263				C
Stewart, E. Wilbur & Eldon / Big Valley / (403) 876-2784			R	
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S	F	R	
Webber, Curtis / Stony Plain / (780) 963-6897			R	C

Chances are if you grow peas or lentils you're already using inoculants. What you may not realize is they're not all created equal. That's why you should insist on Nodulator® XL. With the most active strain of rhizobia, it improves nitrogen fixation for increased root biomass and top growth. It all adds up to higher yield potential. So when you choose Nodulator XL, we suggest you think ahead to harvest time—and think big. To find out more, visit **agsolutions.ca** or contact **AgSolutions®** Customer Care at 1-877-371-BASF (2273).

BASF
The Chemical Company

Always read and follow label directions.

LEGACY				
BI: Busch Ag. Res., Dist: CPS (Canada) Inc./FP Genetics				
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928				C
MAJOR				
BI: N/A, Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027				C
MERIT 57				
BI: Busch Ag. Res., Dist: Canterra Seeds				
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358				C
Welsh, Donald Alan / Milk River / (403) 647-2228				C
MUSKWA				
BI: AAFRD (Lacombe), Dist: N/A				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900				C
NEWDALE				
BI: AAFC (Brandon), Dist: FP Genetics				
Dalton, Dennis / Wainwright / (780) 842-2361			R	
Harbin, Clifford T. & Bruce C. / Rivercourse / (780) 745-2268			R	C
Thompson, M. Ellwood & Kelly / Innisfail / (403) 728-3535			R	C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253				C
PONOKA				
BI: AAFRD (Lacombe), Dist: SeCan Members				
Gibson, Donald / Sangudo / (780) 785-2214				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595			R	
Selte, Donald / Vermilion / (780) 853-2484				C
Webber, Curtis / Stony Plain / (780) 963-6897				C
SEEBE				
BI: AAFRD (Lacombe), Dist: SeCan Members				
Anderson, Ken & Evelyn / Barrhead / (780) 674-5670				C
Beamish, Dale / Jarvie / (780) 954-3960				C
Meinczinger, Matthew Jr. / Busby / (780) 349-2456				C
Webber, Curtis / Stony Plain / (780) 963-6897				C
SUNDRE				
BI: AAFRD (Lacombe), Dist: Mastin Seeds				
Feenstra, Lloyd / Barons / (403) 757-3737				C
Hadland, Arthur Austin / Baldonnel / (250) 789-3566				C
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469				C
Jones, Danny / Beaverlodge / (780) 354-8089	S	F		C
Lyster, Norman / Stettler / (403) 742-4456			R	C
Mastin, Robert B. / Sundre / (403) 556-2609			R	
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595			R	
Richard, Gerald / Spirit River / (780) 864-2339				C
TROCHU				
BI: AAFRD (Lacombe), Dist: SeCan Members				
Kittle, James W. & Andrew / Viking / (780) 336-2583			R	
Smith, Gary W. / Eckville / (403) 746-5878				C
Webber, Curtis / Stony Plain / (780) 963-6897				C
VIVAR				
BI: AAFRD (Lacombe), Dist: SeCan Members				
Beamish, Dale / Jarvie / (780) 954-3960				C
Crop Production Services Canada / Didsbury / (403) 335-3055	S			C
Mans, John / Nobleford / (403) 824-3585			R	
Webber, Curtis / Stony Plain / (780) 963-6897				C
XENA				
BI: Western Plant Breeders, Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027			R	

OATS

	S	F	R	C
AC MORGAN				
BI: AAFC (Lacombe), Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383				C
Graham, Lawrence W. / Innisfail / (403) 227-2336	S			
Harbin, Clifford T. & Bruce C. / Rivercourse / (780) 745-2268				C
Hegland, David Olaf / Wembley / (780) 766-2450				C
Hill, Gordon P. / Taylor / (250) 789-3469				C
Jonk, Nicholas / Westlock / (780) 349-5458			R	C
Kemp, Richard L. / Innisfail / (403) 227-4836				C
Knight, William & G. & Blaine & Craig & Brian / Tees / (403) 784-3633			R	
Macyk, Don / Waskatenau / (780) 358-2411			R	
Massey, Derwin / Stettler / (403) 883-2503			R	
McDonald, Gerald / Cty. Of Grande Prairie No 1 / (780) 538-3868				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595			R	
Ohrn, Norman / Thorsby / (780) 985-2263				C
Richard, Gerald / Spirit River / (780) 864-2339				C
Selte, Donald / Vermilion / (780) 853-2484	S		R	C

Smith, Gary W. / Eckville / (403) 746-5878				C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253				C
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S	F		C
Webber, Curtis / Stony Plain / (780) 963-6897				C
AC MUSTANG				
BI: AAFC (Lacombe), Dist: Mastin Seeds				
Dallas, Bradley C. / Bowden / (403) 224-2162				C
Feenstra, Lloyd / Barons / (403) 757-3737				C
Hadland, Edward / Baldonnel / (250) 789-3646				C
Jonk, Nicholas / Westlock / (780) 349-5458			R	C
Mastin, Robert B. / Sundre / (403) 556-2609			R	
Nikkel, John Jr. / Coaldale / (403) 345-4963				C
Richard, Gerald / Spirit River / (780) 864-2339				C
BRADLEY				
BI: AAFC, Dist: SeCan Members				
Brousseau, Jules / Foisy / (780) 657-2276				C
Jonk, Nicholas / Westlock / (780) 349-5458				C
Selte, Donald / Vermilion / (780) 853-2484	S			
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617		F		
CDC BALER				
BI: CDC, Dist: FP Genetics				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Crop Production Services Canada / Didsbury / (403) 335-3055			R	
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251				C
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928	S	F		
CDC HAYMAKER				
BI: CDC, Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383	S			
Fabian, Patrick V. / Tilley / (403) 377-2000	S			
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929	S			
Hadway, Walter Thomas / Didsbury / (403) 335-4929			R	
Jonk, Nicholas / Westlock / (780) 349-5458			R	
Kotowich, Paul & Dennis / St.Paul / (780) 645-2027			R	C
Selte, Donald / Vermilion / (780) 853-2484	S	F		
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S	F	R	
CDC NASSER				
BI: CDC, Dist: N/A				
Harbin, Clifford T. & Bruce C. / Rivercourse / (780) 745-2268			R	
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251			R	
CDC RUFFIAN				
BI: CDC, Dist: FP Genetics				
Sim, Darwin & Derek / Ponoka / (780) 372-2111	S			
CDC SEABISCUIT				
BI: CDC, Dist: Canterra Seeds				
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322		F		
DERBY				
BI: N/A, Dist: Mastin Seeds				
Mastin, Robert B. / Sundre / (403) 556-2609	S			
Richard, Gerald / Spirit River / (780) 864-2339			R	
FOOTHILL				
BI: N/A, Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383				C
JORDAN				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Jones, Greg Thomas / Ponoka / (403) 783-6495			R	
Nisbet, Andrew E. & Diane E. / Bowden / (403) 224-3788		F		
MURPHY				
BI: AAFC (Lacombe), Dist: SeCan Members				
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617				C
Webber, Curtis / Stony Plain / (780) 963-6897				C
STRIDE				
BI: AAFC, Dist: N/A				
Jones, Greg Thomas / Ponoka / (403) 783-6495		F		
TRIACTOR				
BI: SW Seed Ltd., Dist: Canterra Seeds				
Kapitski, Lawrence / Andrew / (780) 365-2134				C
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322		F		C
WALDERN				
BI: AAFC (Lacombe), Dist: SeCan Members				
Kiffiak, Edwin H. & Nathan J. / Foremost / (403) 867-2338	S	F		

RYE

	S	F	R	C
HAZLET				
BI: N/A, Dist: SeCan Members				
Foster, Norman R. / Beaverlodge / (780) 354-2107				C

	S	F	R	C
MUSKETEER				
BI: N/A, Dist: N/A				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383			R	
Weigum, Sarah / Three Hills / (403) 443-9599				C
PRIMA				
BI: AAFC (Swift Current), Dist: SeCan Members				
Bayes, Harold / Trochu / (403) 443-2208				C
Mueller, Darcy / Three Hills / (403) 823-9788	S			
Weigum, Sarah / Three Hills / (403) 443-9599			R	C

TRITICALE - SPRING

	S	F	R	C
AC ULTIMA				
BI: N/A, Dist: FP Genetics				
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358	S			
BUNKER				
BI: FCDC Lacombe, Dist: FP Genetics				
Airth, Jock & Linda / Brooks / (403) 362-4372			R	
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358			R	
PRONGHORN				
BI: AARD, Dist: No Rep				
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464				C
Mans, John / Nobleford / (403) 824-3585			R	C
SUNRAY				
BI: AAFC, Dist: N/A				
Markert, Louise / Vulcan / (403) 485-6708	S			
TAZA				
BI: FCDC Lacombe, Dist: Solick Seeds				
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358			R	
TYNDAL				
BI: FCDC Lacombe, Dist: SeCan Members				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Card, Gordon B. / Magrath / (403) 758-3444			R	
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464			R	
Dynamic Seeds Ltd. / Fairview / (780) 835-5435				C

TRITICALE - WINTER

	S	F	R	C
LUOMA				
BI: AARD (Lacombe), Dist: Corns Brothers Farms				
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464			R	
METZGER				
BI: AARD (Lacombe), Dist: Haney Farms Ltd.				
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464		F		C
PIKA				
BI: AAFC, Dist: N/A				
Airth, Jock & Linda / Brooks / (403) 362-4372			R	
Kiffiak, Edwin H. & Nathan J. / Foremost / (403) 867-2338				C

WHEAT - DURUM

	S	F	R	C
AAC RAYMORE				
BI: AAFC, Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900	S	F	R	
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464			R	
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151		F		
Hierath, Michael W. & Philip / Milk River / (403) 647-2347	S		R	
Kiffiak, Edwin H. & Nathan J. / Foremost / (403) 867-2338	S		R	
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736	S		R	
Welsh, Donald Alan / Milk River / (403) 647-2228	S		R	
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434		F	R	
Willms, Kevin J. / Grassy Lake / (403) 655-2450	S		R	
BRIGADE				
BI: AAFC, Dist: N/A				
CPS (Canada) Inc. / Regina / (306) 569-5027				C
CDC VERONA				
BI: CDC, Dist: Alliance Seed Corp.				
Van Roessel, William & Jean / Bow Island / (403) 545-6018				C
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434				C
ENTERPRISE				
BI: AAFC (Swift Current), Dist: Canterra Seeds				
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517			R	C
Welsh, Donald Alan / Milk River / (403) 647-2228				C
STRONGFIELD				
BI: AAFC (Swift Current), Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900				C
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151				C
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				C
Hierath, Michael W. & Philip / Milk River / (403) 647-2347			R	C
Kiffiak, Edwin H. & Nathan J. / Foremost / (403) 867-2338				C
Willms, Kevin J. / Grassy Lake / (403) 655-2450			R	
TRANSCEND				
BI: AAFC, Dist: FP Genetics				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900			R	
Strain, Arthur George / Foremost / (403) 867-2227				C
Welsh, Donald Alan / Milk River / (403) 647-2228				C
Welsh, Stuart Jason / Milk River / (403) 647-2228				C

WHEAT - MIDGE TOLERANT

	S	F	R	C
CDC UTMOST-HARVEST				
BI: N/A, Dist: FP Genetics				
Andrukow, Alexander & Chad / Camrose / (780) 672-1208				
Dalton, Dennis / Wainwright / (780) 842-2361				
Galloway Seeds Ltd. / Fort Saskatchewan / (780) 998-3036				
Harbin, Clifford T. & Bruce C. / Rivercourse / (780) 745-2268				
Hoff, Peter Edward / Gleichen / (403) 734-2140				
King, Harold F. / Three Hills / (403) 443-7330				
Markert, Ron / Vulcan / (403) 485-6708				
Persely, Edward & Shirley / Bonnyville / (780) 826-2992				
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251				
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358				
Tomlinson, Chelsea / Redwater / (780) 777-5885				
CONQUER - 5701PR				
BI: N/A, Dist: Canterra Seeds				
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				
Huvenaars, John & Lisa / Hays / (403) 725-2126				
Jensen, Albert / Drumheller / (403) 823-9976				
Lefsrud, Kevin J. & Edmund J. / Viking / (780) 336-2500				
Markert, Ron / Vulcan / (403) 485-6708	S			
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736	S			
Rasmussen, Brian D. & Joel T. / Standard / (403) 644-3800				
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322	S			

ENCHANT-AC CRYSTAL
BI: N/A, Dist: FP Genetics
Dalton, Dennis / Wainwright / (780) 842-2361 S
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251 S

GOODEVE-AC INTREPID
BI: AAFC (Winnipeg), Dist: SeCan Members
Lefsrud, Kevin J. & Edmund J. / Viking / (780) 336-2500

SHAW-AC DOMAIN
BI: AAFC (Winnipeg), Dist: SeCan Members
Huvenaars, John & Lisa / Hays / (403) 725-2126
Sim, Darwin & Derek / Ponoka / (780) 372-2111
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617

UNITY-WASKADA
BI: AAFC (Winnipeg), Dist: SeCan Members
Eliason, Bruce W. / Wrentham / (403) 222-2258

VESPER-WASKADA
BI: N/A, Dist: SeCan Members
Pare, Raymond A. / Wainwright / (780) 842-2073
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617

WHEAT - SPRING

	S	F	R	C
5700PR				
BI: CPS (Canada) Inc., Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027			R	
AAC BAILEY				
BI: AAFC (Swift Current), Dist: Canterra Seeds				
Hundeby, Donald G. / Wetaskiwin / (780) 352-9992				C
AAC BRANDON				
BI: AAFC, Dist: SeCan Members				
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151		F		
Dyck, Heinz W. & Colin & Alan / Rosemary / (403) 378-3321	S		R	
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322	S			
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358	S			
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434		F	R	
AAC CHIFFON				
BI: AAFC, Dist: N/A				
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151	S			
Markert, Ron / Vulcan / (403) 485-6708	S			
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233	S			
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S			
AAC ELIE				
BI: AAFC, Dist: Alliance Seed Corp.				
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736		F		
AAC ICEBERG				
BI: AAFC, Dist: Alliance Seed Corp.				
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736		F		
AAC REDWATER				
BI: AAFC (Lacombe), Dist: SeCan Members				
Galloway, James D. & Peter / Fort Saskatchewan / (780) 998-3036	S	F		
Hadland, Edward / Baldonnel / (250) 789-3646	S			
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929	S	F		
Oatway, Ward / Lacombe / (403) 784-3418	S	F		
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322	S			
Trueblood, Brian G. / Dapp / (780) 954-3745	S	F		
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S	F		
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S	F		
AAC RYLEY				
BI: AAFC, Dist: SeCan Members				
Baier, Bill & Dean / Clyde / (780) 348-5791	S		R	
Dargis, Richard / St. Vincent / (780) 635-2333			R	
Dyck, Heinz W. & Colin & Alan / Rosemary / (403) 378-3321	S			
Hadland, Edward / Baldonnel / (250) 789-3646	S		R	
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929	S	F		
Harris, William P. & L. & Thomas & Alexander / Beaverlodge / (780) 354-2823	S	F		
Kopjar, Gerald M. / Rowley / (403) 368-2409	S			
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240		F		
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736	S		R	
Penner, Larry / Three Hills / (403) 443-7212			R	
Wuthrich, David / Cecil Lake / (250) 781-3527	S		R	
AC ANDREW				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383	S			C
Kittle, James W. & Andrew / Viking / (780) 336-2583				C
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434			R	

AC CRYSTAL				
BI: AAFC (Swift Current), Dist: SeCan Members				
Dyck, Heinz W. & Colin & Alan / Rosemary / (403) 378-3321		F		
Pare, Raymond A. / Wainwright / (780) 842-2073	S			C
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251				C
AC EATONIA				
BI: CPS (Canada) Inc., Dist: CPS (Canada) Inc.				
Willms, Kevin J. / Grassy Lake / (403) 655-2450			R	
AC FOREMOST				
BI: AAFC (Swift Current), Dist: SeCan Members				
Anderson, Ken & Evelyn / Barrhead / (780) 674-5670				C
Andrukow, Alexander & Chad / Camrose / (780) 672-1208				C
Beamish, Dale / Jarvie / (780) 954-3960				C
Bright, David / New Norway / (780) 855-2240				C
Clark, Todd / Edmonton / (780) 472-6308				C
Cyre, Clifford & Greg / Barrhead / (780) 349-4775			R	C
Dallas, Bradley C. / Bowden / (403) 224-2162				C
Ellis, Brian / Olds / (403) 556-2890				C
Galloway Seeds Ltd. / Fort Saskatchewan / (780) 998-3036			R	C
Hadway, W. Tom & Carol / Didsbury / (403) 335-4929				C
Hallett, Dale R. & Richard / Carstairs / (403) 337-2469			R	
Jackson, Thomas / Killam / (780) 385-2332			R	C
Kaun, David E. / Penhold / (403) 886-4562			R	
Kemp, Richard L. / Innisfail / (403) 227-4836				C
Limoges, Marcel / McLennan / (780) 324-3024				C
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240			R	C
Macyk, Don / Waskatenau / (780) 358-2411			R	
Meinczinger, Matthew Jr. / Busby / (780) 349-2456				C
Miller, Brian / Barrhead / (780) 674-5001				C
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595				C
Nanninga, Justin / Neerlandia / (780) 674-3822				C
Niemela, Terrance & Tracy / Sylvan Lake / (403) 746-2645				C
Nisbet, Andrew E. & Diane E. / Bowden / (403) 224-3788	S	F	R	
Radke, Bryan Victor / Barrhead / (780) 674-5715		F	R	
Smith, Gary W. / Eckville / (403) 746-5878			R	
Thompson, M. Ellwood & Kelly / Innisfail / (403) 728-3535			R	C
Victoor, Jesse / Sturgeon County / (780) 459-3253			R	
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253	S		R	C
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928				C

AC SPLENDOR				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251				C
ALVENA				
BI: Semiarid Prairie Agricultural Reseach Centre, Dist: SeCan Members				
Lefsrud, Kevin J. & Edmund J. / Viking / (780) 336-2500	S			
Webber, John D. J. / Berwyn / (780) 338-3657				C
CARBERRY				
BI: N/A, Dist: SeCan Members				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900		F		C
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464				C
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151				C
Dovichak, Michael / Brooks / (403) 501-5420				C
Dyck, Heinz W. & Colin & Alan / Rosemary / (403) 378-3321			R	
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				C
Huvenaars, John & Lisa / Hays / (403) 725-2126				C
Jonk, Nicholas / Westlock / (780) 349-5458			R	C
Kopjar, Gerald M. / Rowley / (403) 368-2409		F		C
Sich, Louis J. & Ivan & Martin / Trochu / (403) 442-2112				C
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233				C
Van Roessel, William & Jean / Bow Island / (403) 545-6018				C
Zwack, Thomas / Daysland / (780) 374-2450				C
CARDALE				
BI: AAFC (Winnipeg), Dist: Seed Depot				
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151			R	
Huvenaars, John & Lisa / Hays / (403) 725-2126			R	
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233			R	
Van Roessel, William & Jean / Bow Island / (403) 545-6018			R	
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434			R	
CDC ABOUND				
BI: CDC, Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027				C
CDC GO				
BI: CDC, Dist: Public				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151		F		C
Crop Production Services Canada / Didsbury / (403) 335-3055				C

Dovichak, Michael / Brooks / (403) 501-5420				C
Dyck, Heinz W. & Colin & Alan / Rosemary / (403) 378-3321	S	F		
Ellis, Brian / Olds / (403) 556-2890				C
Hadway, Walter Thomas / Didsbury / (403) 335-4929				C
Holmen, Jonathan W. & Carson R. / Rosedale / (403) 823-9296				C
Kaun, David E. / Penhold / (403) 886-4562				C
Kemp, Richard L. / Innisfail / (403) 227-4836				C
King, Harold F. / Three Hills / (403) 443-7330				C
Klassen, Ken / Rosemary / (403) 378-4408				C
Limoges, Marcel / McLennan / (780) 324-3024				C
MacFarquhar, Bill / Cremona / (403) 337-2910			R	C
Metzger, Don / Three Hills / (403) 572-3284			R	C
Murray, Bruce / Lethbridge / (403) 327-9389		F		C
Penner, Larry / Three Hills / (403) 443-7212				C
Richard, Gerald / Spirit River / (780) 864-2339				C
Schmermund, Donnie / Calahoo / (780) 967-2850			R	C
Sich, Louis J. & Ivan & Martin / Trochu / (403) 442-2112				C
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233		F		
Templeton, Doran / Lethbridge / (403) 345-4144				C
Weigum, Garry / Three Hills / (403) 443-2476				C
Willms, Kevin J. / Grassy Lake / (403) 655-2450				C
CDC NRG003				
BI: CDC, Dist: Canterra Seeds				
Andrukow, Alexander & Chad / Camrose / (780) 672-1208				C
Kapitski, Lawrence / Andrew / (780) 365-2134				C
Laliberte, Adam & Vos, Henry / Fairview / (780) 835-5286			R	C
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322				C
CDC OSLER				
BI: CDC, Dist: N/A				
Hill, Gordon P. / Taylor / (250) 789-3469			R	
CDC PLENTIFUL				
BI: CDC, Dist: FP Genetics				
Andersen, B. W. / Kitscoty / (780) 847-2022				C
Galloway Seeds Ltd. / Fort Saskatchewan / (780) 998-3036	S	F		
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251	S	F		
Sim, Darwin & Derek / Ponoka / (780) 372-2111	S			

CDC STANLEY				
BI: CDC, Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027			R	
CDC THRIVE				
BI: CDC, Dist: Cargill Ltd.				
CPS (Canada) Inc. / Regina / (306) 569-5027			R	
HARVEST				
BI: AAFC (Winnipeg), Dist: FP Genetics				
Andersen, B. W. / Kitscoty / (780) 847-2022				C
Crop Production Services Canada / Didsbury / (403) 335-3055				C
Dalton, Dennis / Wainwright / (780) 842-2361		F	R	C
Galloway Seeds Ltd. / Fort Saskatchewan / (780) 998-3036	S	F	R	C
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240				C
Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358				C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253			R	
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928	S	F		C
LILLIAN				
BI: AAFC (Swift Current), Dist: SeCan Members				
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151				C
Hierath, Michael W. & Philip / Milk River / (403) 647-2347			R	C
Kiffiak, Edwin H. & Nathan J. / Foremost / (403) 867-2338				C
Strain, Arthur George / Foremost / (403) 867-2227			R	
Welsh, Donald Alan / Milk River / (403) 647-2228				C
Willms, Kevin J. / Grassy Lake / (403) 655-2450	S		R	
MUCHMORE				
BI: AAFC (Swift Current), Dist: FP Genetics				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900				C
Crop Production Services Canada / Didsbury / (403) 335-3055			R	
Galloway Seeds Ltd. / Fort Saskatchewan / (780) 998-3036	S			C
King, Harold F. / Three Hills / (403) 443-7330				C
Massey, Derwin / Stettler / (403) 883-2503				C
Thompson, M. Ellwood & Kelly / Innisfail / (403) 728-3535				C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253	S			C
NRG010				
BI: AAFC (Swift Current), Dist: Canterra Seeds				
Cameron, Danny / Millet / (780) 387-5313	S			
Sendziak, Don P. & Stephen / Edmonton / (780) 434-1322		F		C

PARK				
BI: PCDC, Dist: N/A				
Lyster, Norman / Stettler / (403) 742-4456				C
PASTEUR				
BI: N/A, Dist: SeCan Members				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900	S	F		
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151			R	
McNaughton, Brian / Lethbridge / (403) 308-9914	S			
Mueller, Darcy / Three Hills / (403) 823-9788	S			
Van Roessel, William & Jean / Bow Island / (403) 545-6018				C
SADASH				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Andersen, B. W. / Kitscoty / (780) 847-2022				C
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151		F		C
Eliason, Bruce W. / Wrentham / (403) 222-2258				C
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				C
Huvenaars, John & Lisa / Hays / (403) 725-2126			R	C
Laird, Patrick R. / Paradise Valley / (780) 745-2379			R	
Lindholm, Craig & Stevan & Dane & L. / New Norway / (780) 352-3240				C
Macyk, Don / Waskatenau / (780) 358-2411			R	C
Pare, Raymond A. / Wainwright / (780) 842-2073			R	
Sand, Ron W. & David R. / McLaughlin / (780) 745-2251				C
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233			R	
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434			R	
Wood, Robert & P. & Marshall / Bowden / (403) 224-3928			R	C
STETTLER				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Baier, Bill & Dean / Clyde / (780) 348-5791		F	R	C
Benci, Dennis / Carmangay / (403) 643-2294				C
Cameron, Danny / Millet / (780) 387-5313				C
Clark, Todd / Edmonton / (780) 472-6308				C
Crop Production Services Canada / Didsbury / (403) 335-3055				C
Cyre, Clifford & Greg / Barrhead / (780) 349-4775		F	R	C
Davidson, E. Daryl & Dean / Kitscoty / (780) 846-2456			R	C
Hadway, Walter Thomas / Didsbury / (403) 335-4929				C
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				C
Harris, William P & L. & Thomas & Alexander / Beaverlodge / (780) 354-2823	S	F		C
Huvenaars, John & Lisa / Hays / (403) 725-2126				C
Jackson, Thomas / Killam / (780) 385-2332				C
Kapitski, Lawrence / Andrew / (780) 365-2134				C
King, Harold F. / Three Hills / (403) 443-7330				C
Kittle, James W. & Andrew / Viking / (780) 336-2583				C
Klassen, Ken / Rosemary / (403) 378-4408				C
Kopjar, Gerald M. / Rowley / (403) 368-2409				C
Limoges, Marcel / McLennan / (780) 324-3024				C
Lindholm, Craig & Stevan & Dane & L. / New Norway / (780) 352-3240				C
Massey, Derwin / Stettler / (403) 883-2503			R	C
McDonald, Gerald / Cty. Of Grande Prairie No 1 / (780) 538-3868				C
Miller, Brian / Barrhead / (780) 674-5001				C
Mracek, Stan John / Dawson Creek / (250) 843-7359			R	
Nemetz, Charlie & Jerritt & Lewis & B. / Stettler / (403) 742-0436			R	
Oatway, Ward / Lacombe / (403) 784-3418			R	C
Pare, Raymond A. / Wainwright / (780) 842-2073			R	C
Penner, Larry / Three Hills / (403) 443-7212				C
Sekulic, John Jr. / Rycroft / (780) 765-2280				C
Stewart, E. Wilbur & Eldon / Big Valley / (403) 876-2784				C
Van Roessel, William & Jean / Bow Island / (403) 545-6018				C
Victoor, Rene & Jamie / Sturgeon County / (780) 459-3253				C
Wagner, Terry & Loree / Lacombe / (403) 782-2107				C
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617				C
Weigum, Garry / Three Hills / (403) 443-2476				C
Wuthrich, David / Cecil Lake / (250) 781-3527				C
Zwack, Thomas / Daysland / (780) 374-2450				C
SUPERB				
BI: AAFC (Winnipeg), Dist: SeCan Members				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Jones, Danny / Beaverlodge / (780) 354-8089			R	C
SY433				
BI: Syngenta Canada Inc, Dist: Cargill Ltd.				
Syngenta Canada Inc. / Calgary / (403) 219-5466			R	
SY985				
BI: Syngenta Canada Inc, Dist: Cargill Ltd., CPS (Canada) Inc. Richardson Pioneer and Andrukow Seed				
CPS (Canada) Inc. / Regina / (306) 569-5027	S			
Syngenta Canada Inc. / Calgary / (403) 219-5466				C
WASKADA				
BI: AAFC, Dist: N/A				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383				C
Pare, Raymond A. / Wainwright / (780) 842-2073		F		

	S	F	R	C
WHITEHAWK				
BI: AAFC (Lacombe), Dist: SeCan Members				
Benci, Dennis / Carmangay / (403) 643-2294			R	
WR859 CL				
BI: Syngenta Canada Inc, Dist: Richardson Pioneer				
Syngenta Canada Inc. / Calgary / (403) 219-5466				C

WHEAT - WINTER

	S	F	R	C
AAC GATEWAY				
BI: AAFC, Dist: N/A				
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S			
AC TEMPEST				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Murray, Bruce / Lethbridge / (403) 327-9389		F		
EMERSON				
BI: AAFC, Dist: Canterra Seeds				
Airth, Jock & Linda / Brooks / (403) 362-4372	S			
Corns, Bryan & Gary / Grassy Lake / (403) 655-2464	S			
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151	S			
FLOURISH				
BI: AAFC (Lethbridge), Dist: SeCan Members				
Van Roessel, William & Jean / Bow Island / (403) 545-6018			R	
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434		F	R	

	S	F	R	C
MOATS				
BI: CDC, Dist: SeCan Members				
Airth, Jock & Linda / Brooks / (403) 362-4372		F		
Benci, Dennis / Carmangay / (403) 643-2294		F	R	
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736	S		R	
Metzger, Don / Three Hills / (403) 572-3284			R	
Sekulic, John Jr. / Rycroft / (780) 765-2280			R	
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233			R	
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434		F	R	
PINTAIL				
BI: AARD, Dist: N/A				
Mastin, Robert B. / Sundre / (403) 556-2609			R	
RADIANT				
BI: AAFC (Lethbridge), Dist: Canterra Seeds				
Airth, Jock & Linda / Brooks / (403) 362-4372				C
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151				C
Haney Farms (1985) Limited / Picture Butte / (403) 738-4517				C
Van Roessel, William & Jean / Bow Island / (403) 545-6018				C
Wuthrich, David / Cecil Lake / (250) 781-3527				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 / 1-800-665-5015 /www.brettyoung.ca
Canterra Seeds Ltd. / (204) 988-9750 / www.canterra.com
Cargill Specialty Canola 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
SeCan / 1-800-764-5487/ www.secan.com
Viterra / (306) 569-4448 / www.cpsagu.ca

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

CANOLA - JUNCEA

	S	F	R	C
VT X121CL				
BI: N/A, Dist: CPS (Canada) Inc.				
Mcnaughton, Kevin / Lethbridge / (403) 317-4181				C

CANOLA - NAPUS

	S	F	R	C
1990				
BI: N/A, Dist: DL Seeds Inc.				
Horner, Scott / Lethbridge / (403) 308-8152				C
D-Series Canola Hybrids: D3152, D3513, D3514S				
BI: N/A, Dist: Available through select independent and Co-op retail locations				
DuPont Pioneer / Saskatoon / (306) 385-3001				C
DuPont Pioneer Varieties: 43E02, 45H29, 45H31, 45H73, 45S52, 45S54, 46S53, 46H75				
BI: N/A, Dist: DuPont Pioneer				
DuPont Pioneer / Saskatoon / (306) 385-3001				C
InVigor Canola Varieties: InVigor 5440, InVigor L120, InVigor L130, InVigor L135C, InVigor L140P, InVigor L150, InVigor L154, InVigor L156H, InVigor L159, InVigor L160S, InVigor L252, InVigor L261				
BI: N/A, Dist: Bayer CropScience				
Bayer CropScience / Lethbridge / (403) 329-0706				C
RUGBY				
BI: Agriprogress Inc., Dist: SeCan Members				
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617				C
Proven Seed Varieties: VR9559G,VR9560CL, VR9561GS, VR9562GC, VT500G, VT530G				
BI: N/A, Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027				C

CANOLA - RAPA

	S	F	R	C
Early One				
BI: N/A, Dist: Mastin Seeds				
Mastin, Robert B. / Sundre / (403) 556-2609				C
SYNERGY				
BI: N/A, Dist: AAFC				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383				C
Mcdonald, Gerald / Cty. Of Grande Prairie No 1 / (780) 538-3868				C

FLAX

	S	F	R	C
AAC BRAVO				
BI: AAFC (Lacombe), Dist: FP Genetics				
Dalton, Dennis / Wainwright / (780) 842-2361		F		
Logan, Glenn C. & Marie & Douglas / Lomond / (403) 792-3696	S			
CDC GLAS				
BI: CDC, Dist: SeCan Members				
Holmstrom, Darrell & Barbara / Killam / (780) 385-3574	S			
HANLEY				
BI: AAFC (Morden), Dist: SeCan Members				
Klassen, Ken / Rosemary / (403) 378-4408				C
Lefsrud, Kevin J. & Edmund J. / Viking / (780) 336-2500	S		R	
PRAIRIE SAPPHIRE				
BI: AAFC (Morden), Dist: Alliance Seed Corp.				
Crooymans, John & Joseph & Andrew / Bow Island / (403) 545-2151				C
Feenstra, Lloyd / Barons / (403) 757-3737				C
Stamp, Richard & Marian & Greg & N. & M. / Enchant / (403) 739-2233	S			C
VT50				
BI: CPS (Canada) Inc. , Dist: CPS (Canada) Inc.				
CPS (Canada) Inc. / Regina / (306) 569-5027			R	
WESTLIN 70				
BI: N/A, Dist: CPS (Canada) Inc.				
Mercer, Lloyd A. & C. & Ryan & Bolstad, Leslie / Lethbridge / (403) 327-9736		F	R	

ALFALFA

	S	F	R	C
2010				
BI: N/A, Dist: BrettYoung				
BrettYoung / Rycroft / (780) 765-3069				C
3010				
BI: N/A, Dist: BrettYoung				
BrettYoung / Rycroft / (780) 765-3069				C
4010BR				
BI: N/A, Dist: BrettYoung				
BrettYoung / Rycroft / (780) 765-3069				C
5010				
BI: N/A, Dist: BrettYoung				
BrettYoung / Rycroft / (780) 765-3069				C
55V12				
BI: N/A, Dist: DuPont Pioneer				
DuPont Pioneer / Lethbridge / (403) 327-6135				C
55V48				
BI: N/A, Dist: DuPont Pioneer				
DuPont Pioneer / Lethbridge / (403) 327-6135				C
ACTIS				
BI: N/A, Dist: La Co-op Fèdèrèe				
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653				C
ALGONQUIN				
BI: N/A, Dist: Pask Farms Ltd.				
Cailliau, John / Enchant / (403) 739-3785				C
CONCEPT				
BI: N/A, Dist: Quality Seeds Ltd.				
Petker, Viktor / Rosemary / (403) 378-3964				C
DALTON				
BI: AAFC, Dist: AAFC				
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653				C
EQUINOX				
BI: Forage Genetics, Dist: CPS (Canada) Inc.				
Nikkel, Ed / Lethbridge / (403) 792-2116				C
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653				C
FORCE				
BI: N/A, Dist: Northstar Seed Ltd.				
Holtman, Scott / Taber / (403) 381-1960				C
GENEVA				
BI: Novartis, Dist: CPS (Canada) Inc.				
Slomp, Karl / Brooks / (403) 362-2156				C
LEADER				
Bi: N/A, Dist: Pickseed Canada Inc.				
Pickseed Canada Inc. / Edmonton / (800) 265-3925				C
LEGENDAIRY 5.0				
BIL N/A, Dist: Agronomy Company of Canada				
Gold Medal Seeds Limited / Brooks / (403) 362-3444				C

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MASKA
BI: AAFC, Dist: AAFC
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653 C

PICKSEED 2065MF
BI: Pickseed, Dist: Pickseed Canada Inc.
Pickseed Canada Inc. / Edmonton / (800) 265-3925 C

PICKSEED 3006
BI: Pickseed, Dist: Pickseed Canada Inc.
Pickseed Canada Inc. / Edmonton / (800) 265-3925 C

QWEST
BI: Cal/West Seeds, Dist: Northstar Seed Ltd.
Petker, Viktor / Rosemary / (403) 378-3964 C

SATELLITE
BI: N/A, Dist: Power Seeds Inc.
Nikkel, Ed / Lethbridge / (403) 792-2116 C
Olfert, Thomas A. / Hays / (403) 725-2265 C
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653 C

SOLSTICE
BI: N/A, Dist: Quality Seeds Ltd.
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653 C

SPREDOR 4
BI: Forage Genetics, Dist: CPS (Canada) Inc.
Gold Medal Seeds Limited / Brooks / (403) 362-3444 C

VR TOTAL
BI: N/A, Dist: CPS (Canada) Inc.
Gold Medal Seeds Limited / Brooks / (403) 362-3444 C

WL 319HQ
BI: N/A, Dist: Richardson Seed Co. Ltd.
Gold Medal Seeds Limited / Brooks / (403) 362-3444 C

WL 357HQ
BI: N/A, Dist: Growmark Inc.
Gold Medal Seeds Limited / Brooks / (403) 362-3444 C

WL353LH
BI: N/A, Dist: Growmark Inc.
Gold Medal Seeds Limited / Brooks / (403) 362-3444 C
Van Ee, Aaron / Rosemary / (403) 378-4420 C

WL354HQ
BI: N/A, Dist: Gold Medal Seeds Ltd.
Gold Medal Seeds Limited / Brooks / (403) 362-3444 C

YELLOWHEAD
BI: N/A, Dist: AAFC
Kerschbaumer, John A. / Fairview / (780) 835-4508 C

BROMEGRASS

S F R C

AC KNOWLES
BI: AAFC (Saskatoon), Dist: CPS (Canada) Inc.
Hanson, A. Serle / Valhalla Centre / (780) 358-2286 C
Kerschbaumer, John A. / Fairview / (780) 835-4508 C
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653 C

AC ROCKET
BI: AAFC (Sainte-Foy), Dist: CPS (Canada) Inc.
Noble, Robert / Manning / (780) 836-2337 C
Sallis, Gary / Manning / (780) 836-2381 C

CARLTON
BI: AAFC (Saskatoon), Dist: Phillip's Seeds Ltd.
Dynamic Seeds Ltd. / Fairview / (780) 835-5435 C
Gans, Keith Joseph Peter / Fairview / (780) 835-2208 C
Kerschbaumer, John A. / Fairview / (780) 835-4508 C
Laliberte, Adam & Vos, Henry / Fairview / (780) 835-5286 C
Lay, Dennis M. / Beaverlodge / (780) 354-8357 C
Mittelstadt, Mark Andrew / Fairview / (780) 835-3239 C
Noble, Robert / Manning / (780) 836-2337 C
Sallis, Gary / Manning / (780) 836-2381 C
Shaw, Theron Harry / Fairview / (780) 835-0826 C

FLEET
BI: AAFC (Saskatoon), Dist: SeCan Members
Froese, Cornelius H. / La Crete / (780) 927-4645 C
Hadland, Edward / Baldonnel / (250) 789-3646 C
Hostettler, Fritz / Bluesky / (780) 835-4761 C
Sekulic, John Jr. / Rycroft / (780) 765-2280 C

MANCHAR
BI: N/A, Dist: No Rep
Obrigewitch, Trevor / Fairview / (780) 835-4763 C

MONTANA
BI: Montana State University, Dist: CPS (Canada) Inc.
Olfert, Thomas A. / Hays / (403) 725-2265 C
PEAK
BI: N/A, Dist: Quality Seeds Ltd.
Moskalyk, Kent / Fairview / (780) 835-8378 C
RADISSON
BI: N/A, Dist: SeCan Members
Morseth, Lorne B. / Vulcan / (403) 485-2770 C

CICER MILKVETCH

	S	F	R	C

VELDT
BI: AAFC (Lethbridge), Dist: CPS (Canada) Inc.
Vanderstoel, Jeroen & Maureen / Enchant / (403) 654-2653 C

CLOVER

	S	F	R	C

AURORA
BI: AAFC (Beaverlodge), Dist: BrettYoung
BrettYoung / Rycroft / (780) 765-3069 F
Dynamic Seeds Ltd. / Fairview / (780) 835-5435 C
Maisonneuve, Andre / Guy / (780) 925-3074 C
Moore Seed Processors Inc. / Debolt / (780) 957-3964 C
Richard, Michel / Spirit River / (780) 864-4220 C
Vandeligt, Gerry / Eaglesham / (780) 359-2451 C

FESCUE

	S	F	R	C

BOREAL
BI: AAFC (Beaverlodge), Dist: CPS (Canada) Inc.
CPS (Canada) Inc. / Regina / (306) 569-5027 C
ORACLE
BI: AAFC (Beaverlodge), Dist: Canterra Seeds
Hegland, David Olaf / Wembley / (780) 766-2450 C

NEEDLEGRASS

	S	F	R	C

GROUSE
BI: ARC, Dist: N/A
Andersen, Terry / Bon Accord / (780) 921-3461 C

RYEGRASS

	S	F	R	C

NORLEA
BI: N/A, Dist: N/A
Hadland, Edward / Baldonnel / (250) 789-3646 C
SWIFT
BI: AAFC (Lethbridge), Dist: SeCan Members
Dynamic Seeds Ltd. / Fairview / (780) 835-5435 C

TIMOTHY

	S	F	R	C

ALMA
BI: Pickseed, Dist: ABT Canada
Moore Seed Processors Inc. / Debolt / (780) 957-3964 F C
ARLAKA
BI: N/A, Dist: Pickseed Canada Inc.
Pickseed Canada Inc. / Edmonton / (800) 265-3925 C
CLIMAX
BI: AAFC (Ottawa), Dist: Pickseed Canada Ltd.
Heuston, Scott / Creston / (250) 428-7026 C
COMTAL
BI: N/A, Dist: Pickseed Canada Inc.
BrettYoung / Rycroft / (780) 765-3069 C
Moore Seed Processors Inc. / Debolt / (780) 957-3964 C
DERBY
BI: Growmark Inc., Dist: Growmark Inc.
BrettYoung / Rycroft / (780) 765-3069 C
DOLINA
BI: N/A, Dist: Semican Atlantic Inc.
BrettYoung / Rycroft / (780) 765-3069 C

PROMESSE
BI: BrettYoung, Dist: BrettYoung
BrettYoung / Rycroft / (780) 765-3069 C
Denis, Edwin / Spirit River / (780) 864-2287 C
Williscroft, Gerry & Gary / High Prairie / (780) 523-2660 C

TENHO
BI: Parsons Seeds Ltd., Dist: Moore Seed Processors Inc.
Moore Seed Processors Inc. / Debolt / (780) 957-3964 F C
Skrlik, Perry / Nampa / (780) 322-2190 C

TITAN (LISCHKA IN GERMANY)
BI: N/A, Dist: Northstar Seed Ltd.
BrettYoung / Rycroft / (780) 765-3069 C

TUUKKA
BI: Boreal Plant Breeding (Finland),
Dist: Moore Seed Processors Inc.
Moore Seed Processors Inc. / Debolt / (780) 957-3964 F C

WINNETOU
BI: Parsons Seeds Ltd., Dist: Parsons Seeds Ltd.
BrettYoung / Rycroft / (780) 765-3069 C

WHEATGRASS

	S	F	R	C
AC SALTLANDER				
BI: AAFC (Swift Current), Dist: N/A				
Miller, Kenneth F. / Milk River / (403) 647-2127		F		C
CLARKE				
BI: N/A, Dist: SeCan Members				
Weigum, Garry / Three Hills / (403) 443-2476				C
FAIRWAY				
BI: U of S, Dist: Newfield Seeds Ltd.				
Dynamic Seeds Ltd. / Fairview / (780) 835-5435				C
Hostettler, Fritz / Bluesky / (780) 835-4761				C
KIRK				
BI: AAFC (Saskatoon), Dist: SeCan Members				
Kerschbaumer, John A. / Fairview / (780) 835-4508				C
Swanson, Wray / Milk River / (403) 647-3998				C
NORDAN				
BI: N/A, Dist: No Rep				
Schiebout, Everett H. / Barons / (403) 757-3757				C

BEANS

	S	F	R	C
CDC MARMOT				
BI: CDC, Dist: University of Saskatchewan				
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S			

CAMELINA

	S	F	R	C
MIDAS				
BI: AAFC, Dist: Linnaeus Plant Sciences Inc.				
Linnaeus Plant Sciences Inc. / Saskatoon / (306) 956-2863			R	

CHICKPEAS - DESI

	S	F	R	C
CDC EBONY				
BI: CDC, Dist: N/A				
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S	F		
CDC JADE				
BI: CDC, Dist: N/A				
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S	F		

CHICKPEAS - KABULI

	S	F	R	C
CDC LEADER				
BI: CDC, Dist: N/A				
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S	F	R	
CDC ORION				
BI: CDC, Dist: N/A				
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S	F	R	C

FABA BEANS

	S	F	R	C
CDC SNOWDROP				
BI: CDC, Dist: University of Saskatchewan				
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Sim, Darwin & Derek / Ponoka / (780) 372-2111	S			
Stickland, Brian & Melvin G. & Irma / Red Deer / (403) 886-4875	S			
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BI: Innoseeds B. V., Dist: Bob Park				
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HEMP

	S	F	R	C
CANDA				
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LENTILS

	S	F	R	C
CDC DAZIL				
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CDC GREENSTAR				
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BI: CDC, Dist: University of Saskatchewan				
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BI: CDC, Dist: University of Saskatchewan				
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	S	F	R	C
AAC LACOMBE				
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Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434	S			
AAC PEACE RIVER				
BI: AAFC, Dist: FP Genetics				
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ABARTH				
BI: Limagrain, Dist: FP Genetics				
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Sim, Darwin & Derek / Ponoka / (780) 372-2111	S			
CANSTAR				
BI: AAFC (Morden), Dist: Canseed (Canada) Ltd.				
Mueller, Richard J. & R. R. & Rosemary / Barrhead / (780) 674-2595			R	
CDC AMARILLO				
BI: CDC, Dist: University of Saskatchewan				
Van Roessel, William & Jean / Bow Island / (403) 545-6018	S	F		
CDC CENTENNIAL				
BI: CDC, Dist: University of Saskatchewan				
Jonk, Nicholas / Westlock / (780) 349-5458			R	
Lefsrud, Kevin J. & Edmund J. / Viking / (780) 336-2500			R	

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BI: CDC, Dist: University of Saskatchewan				
Chin Ridge Seeds Ltd. / Taber / (403) 223-3900	S			
CDC GOLDEN				
BI: CDC, Dist: University of Saskatchewan				
Degenhardt, Keith L. & Terry L. & Kerry / Hughenden / (780) 856-2383				C
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BI: CDC, Dist: University of Saskatchewan				
Boles, Don / Three Hills / (403) 443-0123			R	
Foster, Norman R. / Beaverlodge / (780) 354-2107				C
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617		F		
CDC HORNET				
BI: CDC, Dist: University of Saskatchewan				
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Solick, Leonard & Kelsey & Corwin / Halkirk / (403) 884-2358	S			C
CDC LEROY				
BI: CDC, Dist: University of Saskatchewan				
Jonk, Nicholas / Westlock / (780) 349-5458			R	
CDC LIMERICK				
BI: CDC, Dist: University of Saskatchewan				
Lindholm, Craig & Stevan & Dane & Luke / New Norway / (780) 352-3240	S	F		
Warkentin, Harold K. & Errol / Tofield / (780) 662-2617	S			
Willms, Henry & Timothy H. / Grassy Lake / (403) 655-2434		F		
CDC MEADOW				
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Welsh, Donald Alan / Milk River / (403) 647-2228				C
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CDC PATRICK				
BI: CDC, Dist: University of Saskatchewan				
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CDC SAFFRON				
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Welsh, Stuart Jason / Milk River / (403) 647-2228			R	
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Role of Protein in Crop Trait Modification Revealed

Biologists from Indiana University Bloomington led by David Kehoe have shown for the first time that a protein long known to be critical for the initiation of protein synthesis in all organisms also plays a role in the regulation of gene expression. The protein, called translation initiation factor 3, or IF3, is one of three proteins that make up the core structure needed to guide the joining of messenger RNAs and ribosomes as protein translation begins. "Particularly interesting was our finding that IF3 families exist in a number of plant species, including commercially important crops. This means that new approaches to the modification of traits in agriculturally significant plant species may be possible by manipulating the expression patterns of different IF3 family members," says Kehoe.

The discovery has generated excitement for an additional reason. Historically, scientists have had a difficult time studying IF3 because it is so essential for translation initiation that it cannot be altered without causing death. "Now that we know that F. diplosiphon contains two functionally different IF3s, and that each is nonessential, we have a unique opportunity to enhance our understanding of how the structural features of IF3 are related to its function," Kehoe said. "Advancing our understanding of the role of IF3 in translation is likely to provide opportunities to develop new antibiotics that are targeted to this class of proteins."

Scientists Compare Tomato Genomes

Researchers from the United States, Europe and Japan have produced the first comparison of DNA sequences between the domestic tomato and its wild cousins. They also identified which genes are expressed in the present-day tomato. According to the lead author of the study published in the journal Proceedings of the National Academy of Sciences, the results give insight into the genetic changes involved in domestication of the crop and may help with future efforts to breed new traits into tomato or other crops.

The new study shows that a large block of genes from one species of wild tomato is present in domestic tomato, and has widespread, unexpected effects across the whole genome. Among other findings, genes associated with fruit color showed rapid evolution among domesticated, red-fruited tomatoes and green-fruited wild relatives. And S. pennellii, which lives in desert habitats, had accelerated evolution in genes related to drought tolerance, heat and salinity.

New technology is giving biologists the unprecedented ability to look at all the genes in an organism, not just a select handful. "Genomics has fast-tracked previous gene-by-gene analyses that took us years to complete," said Neelima Sinha, professor of plant biology at UC Davis and co-author of the paper.

Bio-Solution to Severe Canola Crop Losses

Led by Marcus Samuel in the Faculty of Science, researchers from the University of Calgary, the University of Toronto and the University of Bordeaux in France have uncovered a plant gene regulatory network that could be genetically enhanced to prevent green seeds from occurring in mature canola.

The research team investigated the de-greening process in a weed species called Arabidopsis, a "model" research plant whose complete genetic makeup is known and which is a close genetic relative of canola. The research team, using a "mutant" strain of Arabidopsis that produces mature green seeds, performed genetic analyses that uncovered a pathway required for seed development and removal of unwanted chlorophyll during seed maturation. They found that a protein that regulates gene expression, called ABI3, is important in removing seed chlorophyll and enabling the seeds to de-green.

"Given the similarity of Arabidopsis and canola, it would be easy to isolate the same genes from canola and use transgenic technologies to create varieties that could withstand freezing conditions, yet produce mature brown-black seeds," Samuel says. "We actually have demonstrated in our laboratory tests that the canola genes work the same way."

New Soil Testing Kit for Third World Countries

Researchers at the University of Maryland and Columbia University have developed a new soil testing kit called SoilDoc, designed to help farmers in Third World countries. On-the-spot soil testing could have major impact in improving crop yields due to poor soils. The kit contains battery-operated instruments and safe materials for agricultural extension agents to handle in the field. They can test for the availability of nitrogen, phosphorus, sulfur and potassium, as well as active organic matter, and certain soil physical limitations. The raw results of the tests are sent by cell phone to a central website. Then, calculations are made and recommendations are delivered back to the extension agent.

The vision is to train the trainers – thousands of extension agents, many with little more than a high school education, to be consultants. They will be ready to diagnose soil fertility problems and offer recommendations to many thousands of "smallholder farmers." These farmers work on less than five acres. The ultimate goal is to significantly increase crop production and food security in Africa.

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