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CONTENTS | SPRING 2019

FEATURES

DEPARTMENTS

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ON THE COVER
Beaver Creek Farms
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What's Old is New Again

Practical CPB insecticide resistance management

As growers head into another production season, some are concerned about Colorado potato beetle populations and rising neonic insecticide resistance.

Ian MacRae, a professor and extension entomologist at the University of Minnesota, offered some practical insecticide resistance management steps at Manitoba Potato Production Days in January in Brandon. MacRae kicked off the conference presentations with a talk about Colorado potato beetle management in a post-neonic world.

The bottom line is we're going to lose neonics, said MacRae. If producers don't lose neonic products to registered use cancellations, they'll lose them to resistance, which is already occurring in Colorado potato beetle. "You're going to have to think differently about your beetle management and a lot of that is due to resistance."

The increase in resistance coincides with synthetic insecticide development. Less reliance on traditional and cultural control methods and more on chemistries to manage insects started in the '50s and '60s. Chemical control methods were rapidly adopted as they were "very effective, very efficient, very cost-effective, and they took less time," said MacRae.

Neonics were introduced in the early '90s and resistance documented as early as 1997.

Two forms of resistance are at play, MacRae said. One selects against susceptible beetles (they are killed by the insecticide), which, over many generations, results in a population resistant to the insecticide used.

The other form is behavioural. "What we've seen in a number of locations, and it sounds like it's happening here, is the extended emergence of adults." That means eggs and larvae can be found in fields well into the month of July, which presents different management issues.

This form of resistance selects against individuals who emerge early (they are killed by the insecticide seed treatment). Late-emerging beetles are what's left of the population, which MacRae calls teenage beetles as "they're the ones that like to sleep in."

"Now you've got a foliar battle later in the season," MacRae said. "If you were [a producer] back in the '80s, this is what it was like before seed treatments. What's old is new again," he said.

Of big concern is any insecticide modes of action that currently control beetle populations could be lost if they're not managed properly. To keep these tools in farmers' toolboxes, steps must be taken now to manage resistance, MacRae maintains.

Producers can take practical actions against resistance development; however, they may have to harken back to the old days. Producers must start thinking about older methods as alternative approaches to keep beetle populations in check, said MacRae.

For example, because neonic efficacy is decreasing across entire areas, producers may be more dependent on foliar insecticides. However, foliar efficacies may vary from area to area. MacRae recommends using a method developed years ago to determine Colorado potato beetle insecticide resistance: on-farm dip tests.

Increased scouting for beetle populations to determine life stages present in the field will help producers make better choices, including those involving insecticide application. Also, producers should be spraying insecticides for larvae control earlier rather than later, as larvae are much easier to kill than adults.

One essential way to decrease the risk of insecticide resistance development is to always follow up any insecticide application, including a seed treatment, with a different mode of action. Rotate chemistries every time, said MacRae.

In addition, apply insecticide after overwintering beetle populations have reproduced to maintain the susceptible genotype in the population for as long as possible.

MacRae's take-home message is simple. "This game is all about keeping products in the toolbox because we may not have a whole lot of new modes of action or products coming out. It's important to keep what we have."

An information sheet on the Colorado potato beetle dip test can be found at www.omafra.gov.on.ca/english/crops/facts/pbeetletst.htm ○

SPUD smart

Spring 2019 - Vol. 16, No. 2

The magazine of the Canadian potato industry.

PUBLISHED BY:

ISSUES INK

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SUBSCRIPTIONS
Spud Smart is published four times a year. To subscribe, please email subscribe@issuesink.com.
Canadian subscription rate is: $45.00/year plus GST.
International subscription rate is CDN$110.00/year.

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Publications Mail Agreement No. 40030841.
Return undeliverable Canadian addresses to:
Issues Ink
403-313 Pacific Ave.
Winnipeg, MB R3A 0M2

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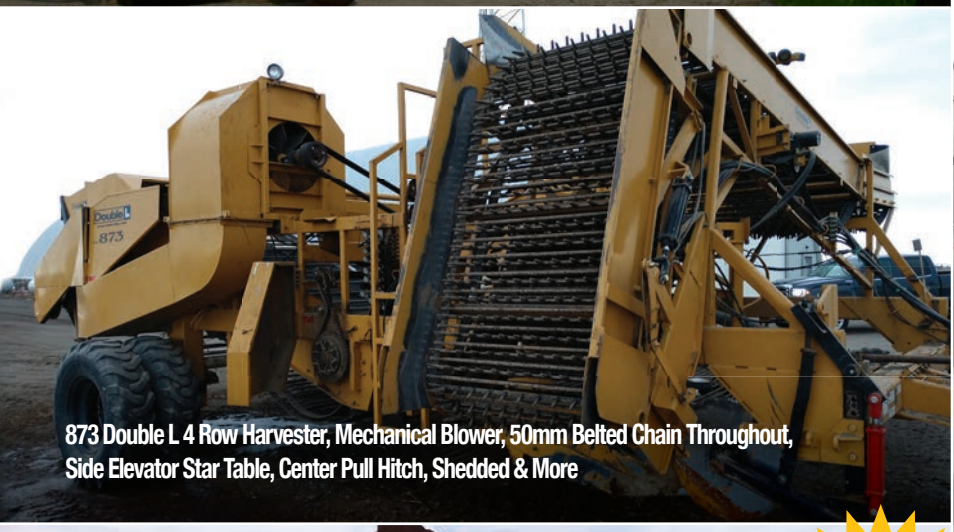

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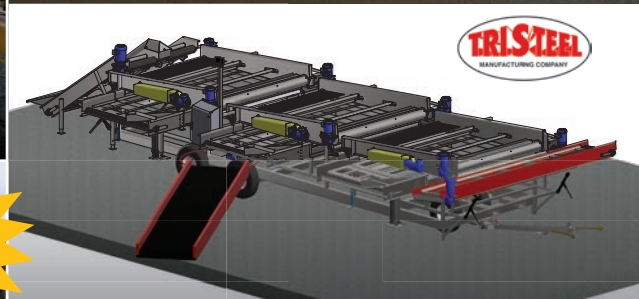

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GOING WITHOUT MANCOZEB

Currently under review by Health Canada's Pest Management Regulatory Agency, the popular Group M fungicide is a potato industry staple for fighting late blight and early blight. Proponents of mancozeb fear its loss would spell higher production costs for farmers and would remove a vital tool for managing disease resistance in potatoes. BY MARK HALSALL

Mancozeb being applied aerially to a potato field in Manitoba.
PHOTO: JONAIR LTD.

CANADIAN POTATO FARMERS could be facing higher production costs with the potential loss of a key weapon against late blight.

Mancozeb is a relatively inexpensive, Group M fungicide that's used extensively in Canada to combat late blight and early blight, with some growers applying the chemical up to 10 times per season on their potato fields.

The broad-spectrum fungicide is currently under review by Health Canada's Pest Management Regulatory Agency due to concerns related to human health and environmental safety.

In June 2018, the PMRA completed a re-evaluation of mancozeb and ruled it unacceptable for agricultural use — with the exception of foliar applications in potato. Only a few months later, however, the agency changed its stance and proposed that all uses of mancozeb be cancelled, except for use on greenhouse tobacco.

Bryan Dion, who runs an aerial crop spraying service based in Portage la Prairie, Man., called Jonair Ltd., has been in discussion with a group called the Mancozeb Task Force, which has been advocating for the continued use of mancozeb in potatoes and a number of other crops.

"Mancozeb is a very valuable product for use on potatoes. It's cost-effective, and there is no known resistance to mancozeb in the world right now," says Dion, who estimates that mancozeb spraying accounts for roughly 40 per cent of his business.

Dion maintains it's not only companies like his that would be hard hit by the loss of mancozeb. The impact on potato growers, he says, would be considerable.

"They'd have to switch chemistries, which will cost them 40 to 50 per cent more. It'd be a significant increase in cost of production for the farmers," he says.

Chlorothalonil is another Group M fungicide registered for use in potatoes in Canada (others include metiram, captan and copper). It recently underwent a PMRA re-evaluation which resulted in the allowable number of applications being reduced from seven to three per season. Dion says product availability issues in the past two of three years have caused chlorothalonil to double in price.

Within the Canadian potato industry, mancozeb is considered an important component of resistance management. As a Group M fungicide, it has a low risk of resistance development due to its multi-site activity on fungal pathogens and it is often tank mixed with single-site fungicides to help with resistance management and to broaden the spectrum of the product.

Darin Gibson, president of the Manitoba-based potato and vegetable research firm, Gaia Consulting Ltd., says single-site products represent an alternative option for growers if mancozeb use is eliminated, but says they are significantly more expensive.

Vikram Bisht, an industry development specialist, potato and horticultural pests, with Manitoba Agriculture, agrees that mancozeb's cancellation would lead to higher production costs for farmers.

"Because of its long history, mancozeb has been used quite often and it is a very economic fungicide. If you take away that, there are other products available, but the costs will certainly go up," he says.

Eugenia Banks, a potato specialist with the Ontario Potato Board, says those costs could rise "to what may prove to be unsustainable levels."

> "Mancozeb is a very valuable product for use on potatoes. It's cost-effective, and there is no known resistance to mancozeb in the world right now."
>
> BRYAN DION

COMPETITIVE DISADVANTAGE

Gibson maintains that cancelling mancozeb would also put Canadian potato producers at a disadvantage with their American counterparts, since the fungicide is permitted on potatoes in the United States.

"If growers in the U.S. have access to mancozeb products and the Canadian growers don't, they'll have much less expensive products they can use, which does give them a competitive advantage," says Gibson.

Banks agrees. "Cancelling mancozeb will put Canadian potato growers out of step with American growers. Canada would allow the import of potatoes treated with mancozeb while banning its use in Canada."

Banks says this position is supported by the Ontario Fruit and Vegetable Growers' Association, which outlined its concerns in a statement recently presented to PMRA.

DISEASE RESISTANCE

Since it was introduced in 1962, mancozeb has become one of the most important foliar disease management tools in potato. In addition to the prospect of higher production costs for farmers, many in the Canadian potato industry worry that eliminating the use of mancozeb would have a significant impact on resistance development in late blight and early blight pathogens.

Darin Gibson, president of Gaia Consulting Ltd., notes that fungicide products with single-site activity have a higher risk of disease resistance developing than a Group M fungicide like mancozeb.

Vikram Bisht, an industry development specialist, potato and horticultural crop pests, with Manitoba Agriculture, agrees. "Many single-site fungicides recommend that they be tank mixed with a multi-site action fungicide, like mancozeb, to reduce risk of resistance development in late blight and early blight pathogens. With potential loss of mancozeb and reduced usage of chlorothalonil, the tank-mixing strategy of resistance risk reduction will be in jeopardy," he says.

Eugenia Banks, a potato specialist with the Ontario Potato Board, says disease resistance to mancozeb has never been reported during nearly six decades of use by growers of many crops, including potatoes.

Banks points out the global Fungicide Resistance Action Committee strongly cautions against restricting the use of multi-site fungicides like mancozeb since this "can result in faster development of resistant plant pathogens, resulting in increased epidemic disease development, major crop losses, and serious consequences for sustainable disease management."

The statement maintains cancelling mancozeb would significantly increase the cost of production, but "as Canada promotes open trade with global countries, Canadian growers cannot simply pass these costs through the supply chain. This unfairly advantages producers in the U.S. who would continue to be able to benefit from mancozeb's unique qualities and cost-effective disease control."

The statement adds that "ultimately, the removal of mancozeb from Canada, while allowing U.S. producers to continue its use on exported products to Canada, represents a very serious threat to Canada's domestic food sovereignty."

Banks says Ontario potato growers have indicated that removing mancozeb from their arsenal of tools to fight late blight and early blight would be "disastrous," and they believe there is no robust scientific data to back up its cancellation.

Andre Gagnon, a communications advisor with Health Canada, says the PMRA re-issued a proposal in respect of mancozeb to allow for an informed consultation to take place.

"Although the previous consultation outlined dietary risks of concern, the associated risk management proposal, that is, the proposed regulatory decision, was inadvertently not included," Gagnon says.

"The proposal should have stated, based on the dietary risk assessment, that all uses were proposed to be cancelled, rather than stating that certain uses were proposed for continued registration with further risk-reduction measures proposed. This could have resulted in PMRA not receiving some data and information related to mancozeb that could have been considered during the initial re-evaluation process."

> "If growers in the U.S. have access to mancozeb products and the Canadian growers don't, they'll have much less expensive products they can use, which does give them a competitive advantage."
>
> DARIN GIBSON

According to Gagnon, the Mancozeb Task Force was given until March 3 to gather and submit information to the PMRA related to current agricultural use practices, which included identifying and ranking the critical agricultural uses of mancozeb in collaboration with agricultural stakeholders.

The Mancozeb Task Force includes Corteva Agriscience, the agricultural division of DowDupont, and a spokesperson for Corteva says several hundred pages of scientific documentation were provided that support the continued use of the fungicide in potatoes, apples and some other specialty crops.

"We think we have very strong science arguments that support [mancozeb in] a number of crops in Canada, including potatoes," says Brenda Harris, Regulatory Affairs Leader for Corteva Agriscience. "We think that mancozeb is an important part of Canadian potato production, that it's safe when used according to label instructions, and it's efficacious. And growers really need it."


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New Way Forward

Agriculture and Agri-Food Canada's potato breeding program is getting a major makeover. Here's how it's changing, and why.

BY MARK HALSALL

THE POTATO BREEDING program operated by Agriculture and Agri-Food Canada has a long history, releasing more than 130 new varieties over the past 90 years. Because of shifts in consumer demand, technologies, markets and growing conditions that have transformed the potato landscape in Canada in recent years, AAFC has decided it's time for a change.

This year, the department's potato breeding program is undergoing a major overhaul in an effort to modernize and become more efficient. Another primary driver is a desire to make the program more responsive to the needs of the Canadian potato industry.

"A key element in modernizing our national potato breeding program is to ensure that we align our objectives with the needs of stakeholders and industry across the country," says Virginia Dickison, an AAFC biologist and operations manager for the breeding program who also acts as an industry liaison officer.

"Our goal is to provide an effective national breeding program that delivers the type of potato varieties that consumers and industry want and need," she adds.

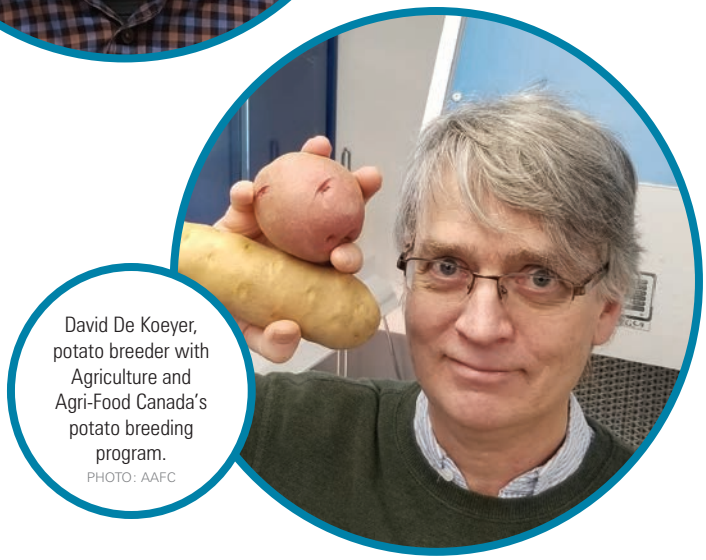
Dickison says one of the main things the potato industry is looking for from the breeding program is a greater emphasis on the processing market.

"We've been covering all segments of the market and we're continuing to do so, but we want to align our breeding percentages based on the market percentages across Canada," she says. "For example, 65 per cent of the market is actually processing lines so therefore we want to have 65 percent of our efforts placed on processing lines."

Dickison says AAFC is also stepping up its efforts to solicit feedback from growers, processors and marketing agencies on what kinds of traits they're looking for, so they can be incorporated into the breeding material used by the potato industry to develop new commercial varieties.

The changes follow an extensive assessment of AAFC's potato breeding program that took place in the summer and fall of last year.

Benoit Girard, director general for Agriculture and Agri-Food Canada's research centres in British Columbia and the Atlantic provinces.
PHOTO: AAFC



David De Koeyer, potato breeder with Agriculture and Agri-Food Canada's potato breeding program.
PHOTO: AAFC

"After reviewing our program and consulting with the potato industry, we are taking steps to better co-ordinate the resources we have, including the Canadian Potato Gene Resources collection," says Benoit Girard, director general for AAFC's Research and Development Centres in British Columbia and the Atlantic provinces.

"Our goal is to not only improve the quality of the potato selections that we can provide to industry and private breeders, but to do it quickly enough to allow them to take full advantage of market opportunities and to respond to the needs of potato growers."

Girard says the Canadian Potato Gene Resources collection, using powerful new technologies such as molecular marking to identify plant traits, will play an even bigger role in AAFC's breeding efforts.

"One of the things that we want to do is tapping into the genetic diversity that exists out there, understand better what that is, and then use that more effectively to incorporate new traits or superior traits in our breeding program [which will result] in better potato varieties," he adds.

"In any field of science, there are evolutions, there are breakthroughs, and the science of 20 years ago is different than it is now. So, what's happening here is we're just keeping up with the times," Girard says.

"We have to adjust because otherwise if we keep doing things the way we were 30 years ago, we'll lose and we won't be as competitive as we should be. [We want] to make sure that we avail ourselves of all the tools that are available now and keep up with science."

As part of the revamped program, David De Koeyer has been named the department's new potato breeder. The geneticist, who has been combining biotechnology and potato breeding for nearly 20 years, will use the latest technologies to explore the genetic potential of the gene bank.

"Our team will use up-to-date equipment, technologies and data management to rapidly identify the plants in the collection that have potential. From here, we will get those traits quickly and efficiently into our breeding program," says De Koeyer.

"Potato breeding is still a bit of a numbers game. You have a lot of candidates to choose from, but you want as early as possible to get a good assessment of the potential of the many so you can narrow that down to a few. With fewer [candidates], you can do a better job of evaluating in multiple location trials."

De Koeyer says strengthening the national aspect of AAFC's potato breeding program is another key objective. "We'll be doing multi-location testing earlier in the program to try to make sure that the material is adapted for both the West and the East," he says.

The department's previous potato breeder, Benoit Bizimungu, will now lead and manage the Canadian Potato Gene Resources collection. The collection holds potato resources suited to Canada's northern climate, including domestic and international varieties, heritage varieties and wild plants.

"Potato breeding is still a bit of a numbers game. You have a lot of candidates to choose from, but you want as early as possible to get a good assessment of the potential of the many so you can narrow that down to a few."

DAVID DE KOEYER

Virginia Dickison, operations manager and industry liaison officer for Agriculture and Agri-Food Canada's potato breeding program.
PHOTO: AAFC

Bizimungu says one of his goals is to more fully understand the genetic potential in the collection.

"The collection is a tremendous source of genetic diversity and traits that my team and I will be studying and characterizing in more detail. This will help bring novel traits and material into our potato breeding program," he says.

Girard says Bizimungu will be looking at genetic resources beyond what's in the Canadian Potato Gene Resources collection.

"He'll not only be studying the germplasm that we have, but he'll also … reach out to other groups around the world," he says. It's hoped the result will be enriched germplasm that can be used to acquire desirable traits.

Bizimungu, De Koeyer and Dickison all work out of the Fredericton Research and Development Centre in New Brunswick. The breeding program also has team members based in Lethbridge and Vauxhall, Alta., as well as a number of other locations in Canada.

"One of the things that we want to do is better co-ordination, better integration and better harmonization between the people that are part of this program," says Girard, adding that part of De Koeyer's role will be travelling to different locations and communicating frequently with team members to ensure the program is operating in a cohesive fashion.

Dickison says an important part of her job as industry liaison officer is travelling to different potato industry trade shows, conferences, field days and grower meetings across Canada to get feedback on how AAFC's potato breeding program is working.

Dickison says she welcomes input from the industry. She can be contacted by email at virginia.dickison@canada.ca or by phone at 506 460 4529. ○

COMMERCIALIZATION STRATEGY

As part of the revamp to the potato breeding program, AAFC is also mulling over possible changes to the way its new varieties are commercialized.

"There will likely be a need to continue to consult with industry and look at how we can perhaps modify or adjust our commercialization strategy," says Benoit Girard, director general for AAFC's Research and Development Centres in British Columbia and the Atlantic provinces.

There's already been a change within the accelerated release program, which enables stakeholders in the Canadian potato industry to see the top varieties from the AAFC breeding program through open houses held each February.

Under a new two-tiered system, the most promising varieties in the accelerated release program will undergo two years of trials in locations across Canada rather than one, before they are released to growers for further evaluation in the field.

Virginia Dickison, industry liaison officer and operations manager for the potato breeding program, says the additional year of data collected under the new system will enable AAFC potato breeders to really dial in on cultivars with the best potential.

Dickison says the accelerated release program open houses weren't held this year but they're likely to resume in 2020, although the format may be different. She notes options being considered include having the event later in the year, in November or early December, as well as adding virtual presentations as a way to broaden the breeding program's reach.

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WINNIPEG TO HOST POTATO ASSOCIATION OF AMERICA MEETING

Winnipeg is gearing up to host the annual gathering of North America's premier potato research organization this summer. BY MARK HALSALL

THE 103rd ANNUAL MEETING of the Potato Association of America will take place July 28 to Aug. 1 at the Delta Hotel in downtown Winnipeg, Man. It's never been held in Manitoba before, and organizers are looking forward to hosting what's considered the premier educational event for the North American potato industry.

"It's the most academic type of potato meeting that we have, and it tends to be the event of the year in North America for potato researchers," says Darin Gibson, who's president of the Manitoba-based potato and vegetable research firm, Gaia Consulting Ltd., and a member of the organizing committee for the 2019 PAA annual meeting.

"It's the first time it's ever been here in the history of PAA which goes back over 100 years, so it's a big deal for our industry and our province," Gibson says. "I think it's a real feather in the cap of the Manitoba potato industry to have it here."

Vikram Bisht, an industry development specialist, potato and horticultural crop pests, with Manitoba Agriculture, is co-chair of the PAA meeting organizing committee. He says the event will showcase what Manitoba is doing in the potato sector "and how we have a huge processing industry and also a very strong fresh market industry. We are a very important player in Canadian potato production."

A non-profit organization dedicated to promoting potato health and use worldwide, the PAA has more than 500 members. They're primarily from the United States, Canada, Mexico and Latin America but another 30 countries are also represented in the PAA membership.

It's hoped that more than 250 PAA members will attend this year's meeting in Winnipeg, says Bisht, adding there will be people coming from all the major potato-producing nations in Europe and Asia, including the Netherlands, India and China. "It attracts people from all over the world," he says.

MARKETING SYMPOSIUM

The PAA conference, which typically touches on a broad range of topics including plant breeding, crop protection, agronomy, and potato utilization and marketing, offers updates on the latest research developments as well as presentations from industry representatives. One of the feature events at this year's meeting in Winnipeg is a symposium on Changes and Challenges in the Potato Marketing Sectors.

Gibson says PAA annual meetings he's attended in the past were all definitely worthwhile. "I know I've found them very beneficial for meeting with colleagues and discussing research that we're all conducting and learning new things," he says.

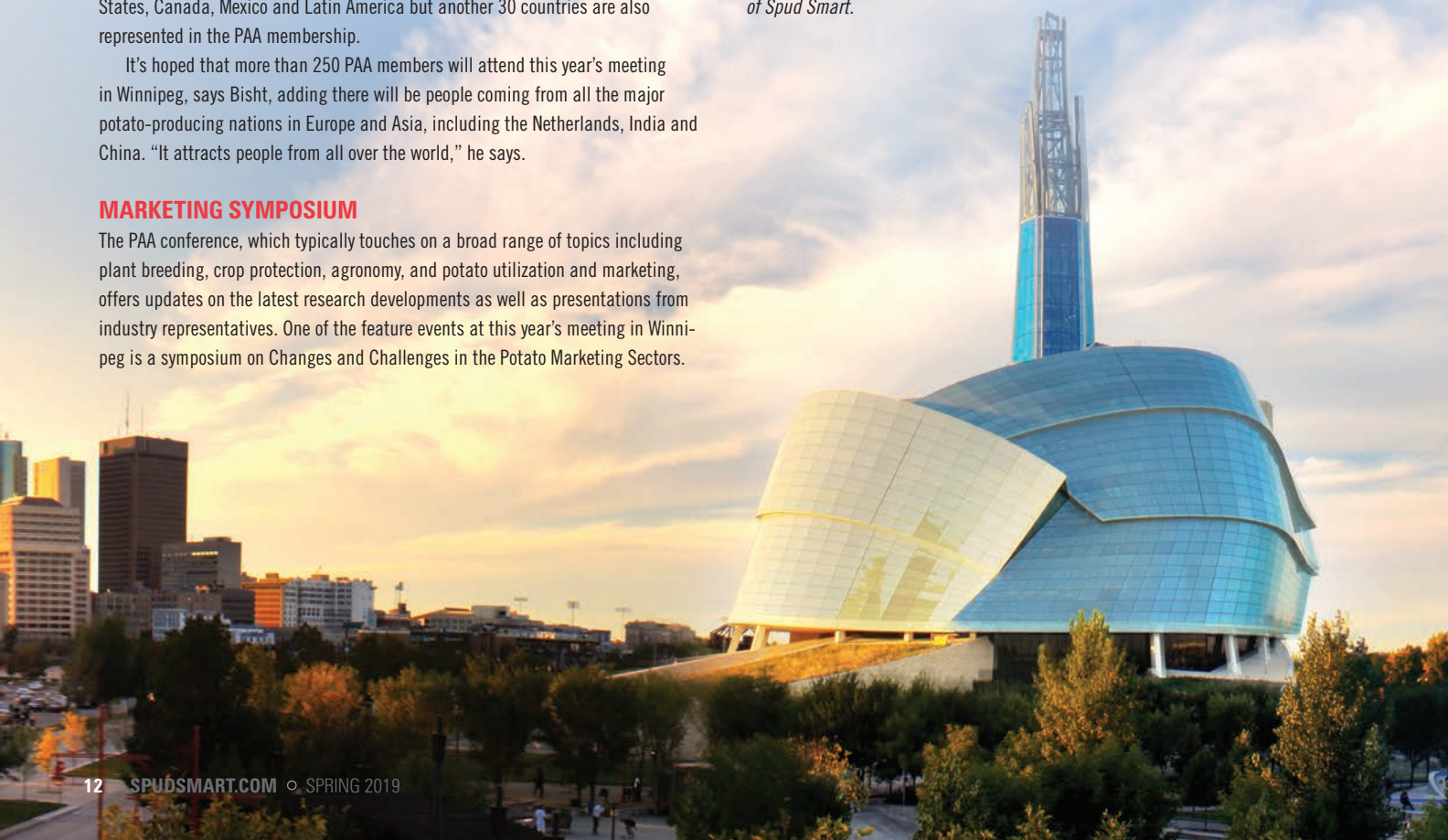
Bisht says while PAA annual meetings are mostly held in the United States, they do come to Canada every four to six years. The last one hosted in Canada was in Quebec City, Que., in 2013.

Bisht says those attending the 2019 PAA annual meeting will get to see what the city known as the "Gateway to the West" has to offer visitors.

"Winnipeg is known for many unique historic places like the Exchange District, The Forks and the Canadian Human Rights Museum, so there are very good places to visit," he says, adding that during the conference, time will be set aside for a trip to the city's Assiniboine Park Zoo to see the acclaimed polar bear exhibit. This year's PAA meeting will also feature a tour of the Canadian Malting Barley Technical Centre in Winnipeg.

More information on the 2019 PAA annual meeting agenda, registration, and accompanying persons program can be found at paaevents.org. ○

Editor's Note: Don't miss PAA meeting coverage in upcoming issues of Spud Smart.



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A White Russet packing shed.
PHOTO: J.R. SIMPLOT COMPANY.

White Russet potatoes growing in a field in eastern Idaho.
PHOTO: J.R. SIMPLOT COMPANY

Innate Outlook

The U.S. company behind the biotech potato says when it comes to Innate adoption in Canada, it will continue to be "patiently persistent."

BY MARK HALSALL

INNATE POTATOES, the biotech spud from Idaho-based J.R. Simplot Company, have been approved for production and sale in Canada since 2016.

Since then, Innate has been grown in field trials in P.E.I., Ontario and Manitoba and the trials are expected to continue in 2019. But aside from a few acres in Ontario that's producing an Innate chip variety for an American processor, there isn't any commercial production of Innate potatoes in this country. You won't find Innate in any Canadian stores either.

Doug Cole, senior manager of marketing and biotech affairs at Simplot, says the company is building its program in Canada from the ground up and it takes time for a product like Innate to gain acceptance.

"We want to make sure that the market comes to us," says Cole. "We are patiently persistent. We will wait until the marketplace is ready."

Innate technology was developed by introducing genes from wild and cultivated potatoes to enhance and suppress specific traits.

The first-generation traits of Innate are reduced bruising and black spots and a lower amount of the amino acid that produces the natural chemical acrylamide during cooking. The Gen 2 potatoes feature Generation 1 traits plus late blight tolerance and lower sugar levels for optimal storage and improved processing.

Cole says it's Simplot's position that it's largely up to potato producers to drive adoption in Canada by selling retailers and consumers on the benefits of Innate potatoes, and that growers who participated in Innate trials in Canada should be front and centre in developing this market.

"These growers have seen the product in the fields, have tested it vis-a-vis conventional counterparts, and I think are fully aware of its capabilities. They're having their own conversations with retailers or they're coming with us to meet with them to basically demonstrate that the growers want this, that this is something that's beneficial to the industry," says Cole.

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White Russet potatoes in a supermarket bin.
PHOTO: J.R. SIMPLOT COMPANY

"This really just comes down to Canadian retailers and food service providers — once they demonstrate interest, we have plenty of growers lined up that would like to grow for us. We're starting with trying to get the customers first and then we will follow suit in selling seed to Canadian growers."

Cole believes a pioneer will eventually emerge among Canada's retailers and food service companies that puts Innate's health and sustainability benefits "first and foremost" for its consumers.

"In the marketplace, there is hesitancy in being first, but everybody wants to be second," says Cole. "All [retailers] want to be in the leading edge … once that retailer does go first, there's usually a whole bevy that want to jump on because they don't want to be left behind."

Kevin MacIsaac, general manager of the United Potato Growers of Canada, says he's aware of discussions taking place about Innate between potato growers and packers and some of the country's large grocery chains as well as a few smaller chip manufacturers. He believes there is some interest but not enough at the present time to spur any retail orders or chip contracts.

MacIsaac is optimistic, however, that Innate will eventually catch on in Canada.

"I think time will work some of these things out. It's a process where you have to educate people who don't understand the background behind this breeding program, what the advantages are to the grower, to the industry people, and to the consumer," MacIsaac says.

"I think eventually we'll get to that point someday but it's not there today." *(continued on page 18)*

Kevin MacIsaac is the general manager of the United Potato Growers of Canada.

Cultivate potato (right) next to a conventional Russet Burbank (left).
PHOTO: J.R. SIMPLOT COMPANY

ARCTIC APPLES: AT THE FOREFRONT OF BIOTECH CONSUMER EDUCATION

Neal Carter picks Arctic apples from a tree.
PHOTO: OKANAGAN SPECIALTY FRUITS INC.

Doug Cole, senior manager of marketing and biotech affairs at J.R. Simplot Company, says Innate potatoes are at the forefront of a new wave of biotech food products with consumer benefits being developed for the marketplace, and he points to the non-browning Arctic apple as another example.

Arctic apples were developed by Okanagan Specialty Fruits Inc., a Canadian company located in Summerland, B.C.

Two Arctic apple varieties received regulatory approval to be grown, sold and consumed in Canada in 2015. A third non-browning variety was approved by Canadian health officials in early 2018.

Neal Carter, president of Okanagan Specialty Fruits, says the company produces all of its own apples in commercial fruit orchards located in eastern Washington.

"At some point we will begin production of commercial operations in Canada, but we do not yet have a timeline for that," says Carter.

Arctic apple products have been available to consumers through Amazon and some retailers in the United States since 2017, but they aren't sold in stores in Canada yet. Carter notes there are plans to introduce Arctic apples to the Canadian market shortly after the 2019 harvest.

"We are already actively attending various industry tradeshows and engaging with retailers, dietitians, the media, consumers and other stakeholders to bring awareness to the unique benefits Arctic apples offer," Carter says.

"Our goal is to educate as many consumers as possible about the many common misconceptions that are out there surrounding biotech foods, including sharing that there is an extremely rigorous process that all biotech foods must satisfy before they can be freely grown and sold," he adds.

"Arctic apples are the most studied apple there is and reviews from experts at the U.S. Department of Agriculture, Food and Drug Administration, Canadian Food Inspection Agency, and Health Canada all agree that Arctic apples are as safe and healthy as other apples," says Carter.

"We have found in our experience that transparency and enabling the public to experience Arctic apples firsthand are very impactful in educating consumers and gaining their support."

Arctic apple products.
PHOTO: OKANAGAN SPECIALTY FRUITS INC.

Non-browning Arctic apple (right) and a conventional apple (left).
PHOTO: OKANAGAN SPECIALTY FRUITS INC.

Peter VanderZaag, owner of Sunrise Potato in Alliston, Ont., and a noted potato scientist, is a proponent of Innate, believing the biotech potatoes benefit growers, consumers and the environment.

"Once people see the merits or the benefits of the Innate potato, I think they'll say this is something we like and it'll catch on," VanderZaag says. "I believe there needs to be some kind of nudge from Simplot or some retailer here in Canada to make that happen."

U.S. SITUATION

It's a different picture for Innate south of the border, where the potatoes are currently available in some 4,000 supermarkets.

Cole points out that Simplot is entering its fifth year of selling the White Russet potato featuring Cultivate and Acclimate russet varieties in the United States.

"We are excited about our continued growth in the White Russet program. We are now up to two million units sold in 40-plus states, and we're very satisfied with the response so far," he says.

In addition to the White Russet fresh market potato, Innate also offers a Generation 2 variety for the chip processing market, an Atlantic potato called Hibernate.

Currently, Innate fresh and chip potato varieties are being grown commercially on about 4,000 acres in the United States.

Cole says production is expected to expand even further when Innate potatoes are accepted by regulatory authorities in more countries. In addition to the United States and Canada, Innate Generation 1 potatoes are approved in Mexico and Japan, and Simplot anticipates additional approvals by such countries as South Korea and Taiwan will come in early 2019.

> "Once people see the merits or the benefits of the Innate potato, I think they'll say this is something we like and it'll catch on."
>
> PETER VANDERZAAG

Coles says plans are in the works to introduce a Generation 3 potato to the marketplace that has additional late blight resistance genes (make it, in Coles words, "a global potato") and is also resistant to potato virus Y, a major disease in seed potato production.

Cole says the Generation 3 Innate potato should be ready in about three to four years, and when that happens it will be submitted to Canadian regulatory authorities for approval. ○

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Promoting Potatoes

Potato marketers in Canada have stepped up their efforts to convince consumers to eat more spuds. Thanks to innovative media campaigns by P.E.I. Potatoes and Manitoba's Peak of the Market, more Canadians are paying attention. BY MARK HALSALL

P.E.I. POTATOES HAS established a strong reputation as a leader in marketing and promoting potatoes, both within Canada and abroad. It has now come out with a new media campaign that relies heavily on the Island's beauty and rich potato heritage to further entrench the Prince Edward Island Potatoes brand in the minds of consumers.

The new television and online marketing campaign kicked off in November with a 30-second video called "What Does It Take?"

It builds on the success of the "It Takes an Island" campaign rolled out in 2017, which featured two TV ads (a one-minute spot and a 30-second spot) that appeared in Prince Edward Island and elsewhere in the Maritimes as well as Ontario. The videos were also promoted heavily on P.E.I. Potatoes' Facebook page and YouTube channel.

"Our [2017] campaign in total garnered about four and a half million impressions, and based on our very small media budget, we were blown away," says Kendra Mills, marketing director for P.E.I. Potatoes.

"The positive nature of the feedback that we got from consumers was beyond expectations … we're kind of expecting that again to be honest with you."

Mills says the "It Takes an Island" spot that was the focal point of P.E.I. Potatoes large-scale media campaign in 2017 was the first time her organization ventured into television advertising.

"Online and social media and those kinds of things, they are such an important part of a media campaign, but at the end of the day television really is the number one way to reach mass audiences," says Mills.

"We also felt we have a really great visual brand … and we wanted to make the most use of that."

All of the videos, which are aimed at boosting brand awareness of P.E.I. Potatoes, rely strongly on the picturesque qualities of Prince Edward Island, with beauty shots of potato farming playing a central role.

"P.E.I. is a beautiful place with clean water and air and all the things that people love the Island for … and we're growing a healthy product in amongst all of that. So we really see place of origin as being a key part of our marketing strategy," says Mills.

The 2018 video basically uses the same script, but relies on different imagery. "We had so much beautiful footage that we wanted to recut it again," Mills says.

Film crew at work during production of P.E.I. Potatoes 2017 television spot.
PHOTO: P.E.I. POTATO BOARD

Screen shot from P.E.I. Potatoes 2017 television spot.
IMAGE: P.E.I. POTATO BOARD

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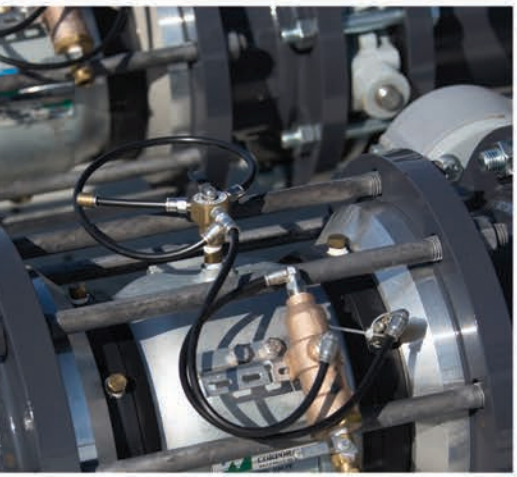

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She adds the new television spot is running only in Prince Edward Island this time around due to budget considerations. Consumers in Ontario and the rest of the Maritimes can see the video via Facebook and YouTube once potatoes from the Island's 2018 crop begin hitting the store shelves.

"We only air on TV locally because we basically can reach all of P.E.I. with a few stations," she says. "Everything else is based on affordability, and is online."

Mills says her organization relies heavily on farmers not only to appear in videos and other marketing materials, but also to spread the message about the goodness of the Island's potatoes.

With more growers, especially younger farmers, posting great pictures and becoming adept in social media, she says, this has become a big part of the storytelling about potatoes.

"I get so excited about it because it's the most genuine, authentic way of telling the story," says Mills. "There's nothing fabricated, there's nothing fake about it. It's the real thing, and I think that really shines through in any food marketing."

Photo taken of a potato farmer at work during production of P.E.I. Potatoes 2017 television spot. PHOTO: P.E.I. POTATO BOARD

"It was all about a stand-alone campaign brought to you by 'The Potahto Lovers of Manitoba.' We wanted people to say, 'Hey, what's this about, what's that on the billboard, what's that on social media?'"

LARRY MCINTOSH

POTAHTO LOVERS OF MANITOBA

Peak of the Market, Manitoba's farmer-owned fresh produce marketing board, also scored a major marketing success recently with a campaign that had a lot of Manitobans asking: "What exactly is a Potahto?"

"We were looking for a way of reintroducing the potato and having some fun with it, and we met with an advertising agency called Think Shift," says Larry McIntosh, president and CEO of Peak of the Market. "They came to us with the 'Potahto' proposal, and we were unanimous in thinking that was a fantastic idea."

The new potato marketing strategy was a take on the "tomato, tomahto" saying, and it revolved around a new superfood called the "Potahto," which Peak of the Market hoped would pique the interest of consumers. The campaign kick-off in September 2017 featured a four-minute mockumentary on the Potahto as well as a billboard blitz in Winnipeg.

"From a branding point of view, we didn't put Peak of the Market on any of the billboards or any of the websites and social media. It was all about a stand-alone campaign brought to you by 'The Potahto Lovers of Manitoba.' We wanted people to say, 'Hey, what's this about, what's that on the billboard, what's that on social media?'" says McIntosh.

McIntosh says social media was the main thrust of the campaign, which provided a nice fit for a key demographic sought out by Peak of the Market — the millennial generation. Humour was also used extensively as a marketing tool.

Eighty-six Winnipeg restaurants participated in Potahto Week 2019. PHOTO: PEAK OF THE MARKET AND THINK SHIFT INC.

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"During the campaign, 80 per cent of what we did in social media was about providing fun, interesting and useful facts, and really only about 20 per cent was about branding. It was more about having some fun with it and poking some fun at the potato," McIntosh says.

Bryce Loewen is a 30-year-old potato farmer who works at his family's farm called Garden Valley Vegetable Growers in Winkler, Man. Loewen says he liked how the Potahto campaign spread its message primarily through social media, and he can appreciate how this resonates so well with millennials.

The Potahto campaign kick-off in September 2017 included a billboard blitz in Winnipeg, Man.
PHOTO: PEAK OF THE MARKET AND THINK SHIFT INC.

"I like that they're targeting a younger demographic, hopefully someone who in the next five to 10 years is going to take up more of the buying power in our economy," he says.

"I believe that in order for potato producers to stay relevant, marketing is just as important as our sales team," Loewen adds. "And I do think [the Potahto campaign] was a positive step towards having a multi-pronged approach in selling our Manitoba potatoes."

The Potahto campaign was largely successful in getting many people to rediscover potatoes. "It was very effective," says McIntosh.

NATIONAL STRATEGY

Back in 2016, P.E.I. Potatoes and Manitoba's Peak of the Market were involved in a successful national campaign called "Half Your Plate" that featured magazine ads as well as videos of celebrity chef Michael Smith serving up potato and other vegetable dishes. Both organizations, along with other Canadian potato groups, contributed funds for the project.

Kendra Mills, marketing director for P.E.I. Potatoes, says the Half Your Plate campaign has been a success but she's unsure if another joint project involving the different regional potato associations is something that will happen anytime soon.

Mills says it's hard to get groups to commit the necessary money and resources required for a national promotion campaign, especially when "everybody's got a different ship they're steering."

Larry McIntosh, president and CEO of Peak of the Market, agrees that national campaigns are very expensive, and "it's difficult to get everybody to put up that kind of money."

McIntosh says he believes individual potato suppliers and regional associations will likely continue to do their own thing for now, but he does see a day when all of the groups get together to work on a program similar to what's being done by Potatoes USA, the national potato marketing agency south of the border.

"I'm not sure if it's in the next five or 10 years, but I think that's just going to make sense, especially as we consider what the U.S. and some other countries are doing with national programs, looking at their successes and saying, 'you know, we need to do that,'" McIntosh says.

"It's not going to be the next few years I think, but I do think that's just a natural progression where we're going to end up going."

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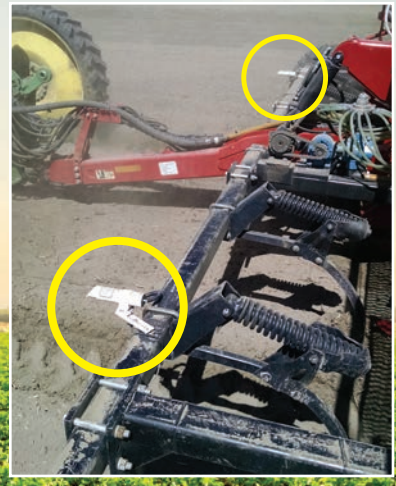

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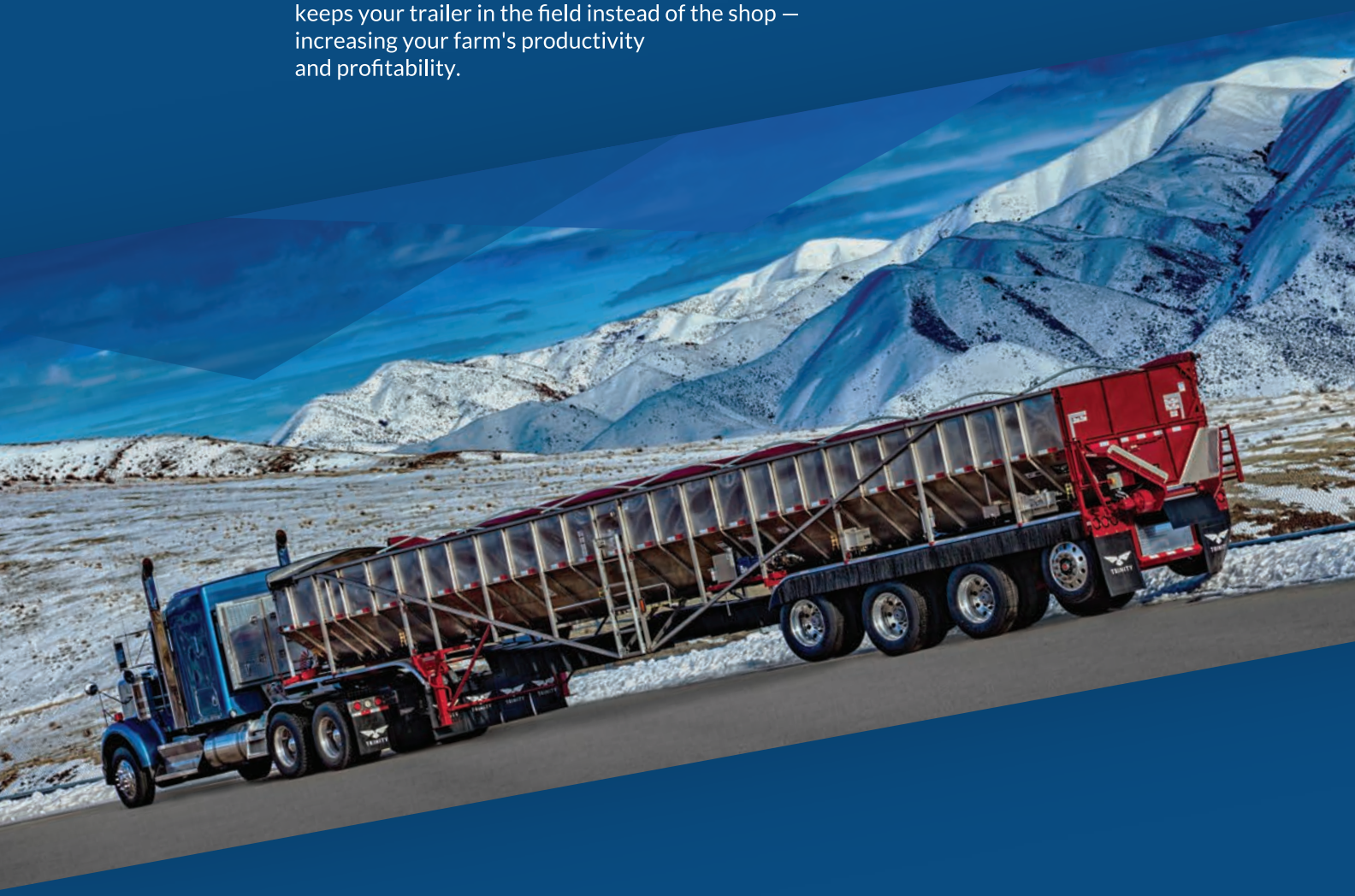

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TRINITY

The campaign continued in 2019 with a week-long celebration of potatoes called Potahto Week from Feb. 23 to Mar. 3.

McIntosh says the first edition of Potahto Week in February 2018 saw 50 restaurants around Winnipeg add new, innovative dishes featuring potatoes to their menus. This year's event made an even bigger splash.

"Potahto Week 2019 was a huge success with 86 Winnipeg restaurants participating. I was truly amazed at the creativity that the chefs put into developing their potato, sorry Potahto, dishes. This year, I along with my co-workers, were able to visit every single restaurant, thank them for participating and, in many cases, try their Potahto dishes," says McIntosh.

"We don't normally deal with restaurants directly because they buy through food service companies that we sell to, so this is an opportunity for us to talk to chefs and owners of restaurants and get them excited about potatoes and have some new dishes out there," he adds.

"There were certainly restaurants that put something on the menu and then kept them even after Potahto Week because they were successful, and that to me is just a huge thing. And if the servers are talking about potatoes during Potahto Week, that's just great for us." ○

P.E.I. Potatoes has now come out with a new media campaign that relies heavily on the Island's beauty and rich potato heritage.
PHOTO: P.E.I. POTATO BOARD

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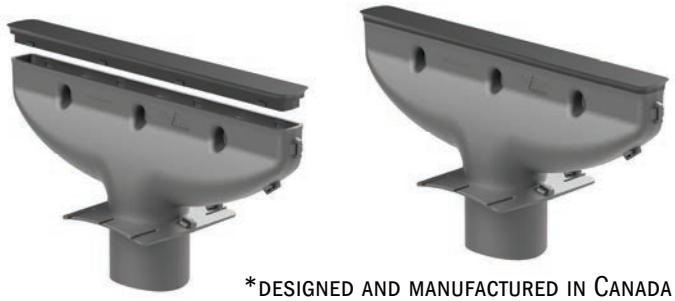

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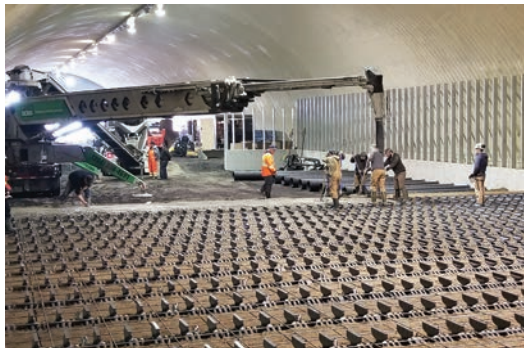

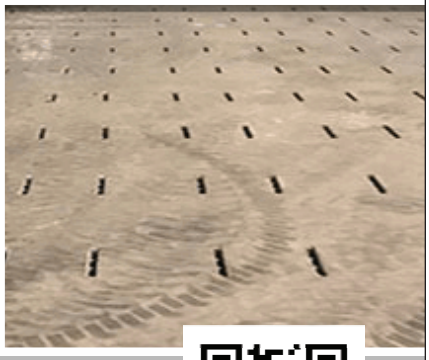

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WHAT CONSUMERS WANT AND FARMERS NEED

Results from consumer studies will help industry stakeholders market potatoes. BY TREENA HEIN

GATHERING GOOD INFORMATION is important for any sector in meeting current and future market demands, and researchers at the University of Guelph and Agriculture and Agri-Food Canada are continuing to do just that with regard to conventional and pigmented potatoes.

Most consumers know by now that eating fruits and vegetables rich in antioxidants may decrease their chances of developing heart disease, cancer and more. Because potatoes are already such a popular food, coloured potatoes could turn into a potentially significant and cheap source of antioxidants in our diets, says Reena Pinhero, a research scientist at the Department of Food Science, University of Guelph.

Pinhero has been studying consumer response to potatoes for several years with her colleague Rickey Yada, who is also with the U of G's Department of Food Science. Yellow potatoes are high in carotenoids, Pinhero says, and red, purple and blue tubers are rich sources of phenolic acids and anthocyanins.

"However, not much work has been done on sensory attributes of the pigmented potatoes," she reports. "Phenolic acids are often bitter, acrid or astringent, and therefore it is important to conduct sensory evaluation and acceptance. And colour may affect the perception of sensory attributes such as aroma, texture and flavour."

The study is part of an Ontario Ministry of Agriculture, Food and Rural Affairs project, and during the first two years, Pinhero and Yada cooked white, yellow, red and purple varieties in a few different ways to determine which method produces healthier glycemic index (GI) and glycemic load (GL).

The varieties, provided by Grand Bend Produce, are Adora, Yellow Star, Carlingford, Purple Fiesta, French Fingerlings, Ciklamen, Red Thumb and Smart. Vanessa Currie, a U of G technician in the Department of Plant Agriculture, and her colleagues helped Pinhero and Yada choose and source the varieties tested, so that, says Currie, the study "would reflect the new emerging varieties that are being developed."

The processing methods were baking, boiling and cooling in the fridge at 4 C (retrogradation), followed by reheating in a microwave for one minute, and microwave cooking. The method of boiled-and-cooled was chosen for the recent sensory evaluation study, in which 65 people ranked the varieties by colour, flavour, texture and overall like or dislike. The results from this study will be used by the Ontario Potato Board for marketing purposes.

AAFC CONSUMER PREFERENCES EVALUATION

Sensory testing is also done by AAFC scientists and staff within the national potato breeding program based in Fredericton, N.B. "We do a lot of testing and evaluation of consumer preferences in-house and we may outsource some of this in future to get a higher degree of validation," says breeding program team member and molecular biologist, Virginia Dickison.

"We will be reviewing our procedures and consult with experts in this field to develop mechanisms to ensure that our varieties are as close as possible to what

AAFC breeders are always looking at developing varieties that have greater health attributes, such as higher levels of antioxidants.

consumers desire. It's part of making changes to the breeding program that will result in better links to industry partners and to consumers," she says.

The team is also examining how the use of high-throughput analysis and DNA markers can help in the decisions of which chip, baking or table varieties to develop.

"AAFC potato breeders have done, and will continue to do, the breeding and science well, but we want to step up other aspects of the program," says AAFC breeder David De Koeyer.

"We have to make sure the commercialization aspects are strong so that the program remains competitive. Right now, less than 10 per cent of what's grown in Canada are AAFC varieties, and it's been over 20 per cent in the past, and we'd like to get back to that level. We recognize there's a need to evaluate how the program has worked in the past, and we had an external review completed in September 2018."

Any breeding program must develop breeding profiles that match market needs, and De Koeyer says 65 per cent of potatoes in Canada are used for processing, about 25 per cent go to the table/fresh market, and the rest are grown for seed.

Russet Burbank is still the main processing variety used in Canada, but it's slowly being replaced by newer varieties, says De Koeyer, that are similar but have better disease resistance and mature earlier.

Sensory testing is also done by AAFC scientists and staff within the national potato breeding program based in Fredericton, N.B. PHOTO: AAFC

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Coloured potatoes could turn into a potentially significant and cheap source of antioxidants in our diets. PHOTO: AAFC

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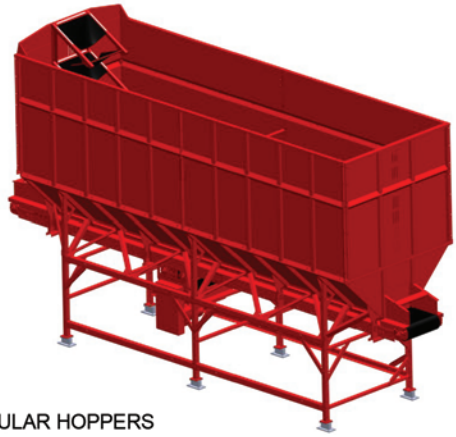
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Russet Burbank itself can't really be improved on as it is male sterile, and female parent plants are not very successful. De Koeyer notes that Russet Burbank "does have a packet of traits that are not easy to equal, but we have breeding material equal to it, and I would say that generally, breeders have done a lot to create varieties similar to it in processing quality and also in disease and pest resistance. That work continues."

And while they do their best to meet the needs of growers for the chip market, AAFC breeders are always looking at developing varieties that have greater health attributes such as higher levels of antioxidants. Indeed, AAFC has released numerous varieties over the last few years to meet many areas of consumer desire. Benoît Bizimungu, leader of Canadian Potato Gene Resources at AAFC, says these include creamer types AR2011-06 (AAC Poppy) and AR2012-09 (AAC Island Ruby), pigmented AR2009-10 (AAC Blue Steele), AR2012-06 (AAC Cinderella) and AR2015-12 and AR2015-13 (both yet to be named, registration pending). "Since the ability to meet future needs depends also on available genetic diversity," he says, "we are also working to revamp our gene resources research program."

De Koeyer says the AAFC breeding program is evolving to build stronger ties with industry so that AAFC breeders are sure the attributes they are focussing on are the right ones. "This currently involves more meetings, using industry input to better refine product profiles, and getting that input — more feedback about new varieties — in terms of their strengths and weaknesses," he says.

"We haven't had that in the past to the degree we need. We need more feedback mechanisms in place to make sure the information is flowing back to us efficiently. We're going to review the commercialization model of the last 20 years to make sure it still meets the needs of industry, and come up with more ways of promoting new selections."

De Koeyer adds that he and his colleagues would actually like the program, in collaboration with industry, to produce a fresh variety that consumers can get to know and seek out in the grocery store for repeat purchases, as has happened to some extent with Yukon Gold.

Looking forward, De Koeyer believes "there's a really good opportunity to make great breeding progress, to incorporate the technologies I've been working on throughout my career and apply them to the breeding program. Breeding is an incremental process and, retrospectively, I get a lot of satisfaction about seeing the progress that we've made. There are so many new technologies in genetics and information management we can make use of, and we can make breeding of potatoes as successful as any other crop. I am confident we are heading in the right direction." ○

Editor's Note: To learn more about the changes to the AAFC Potato Breeding Program, read Mark Halsall's story "New Way Forward" starting on page 8.


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PRECISION FARMING
Getting Seeding Depth Right: A Farmer's Perspective

BILL MENKVELD Vice-President, Sales and Marketing • Greentronics • greentronics.com

Making time for potato industry conferences and events is a great way to learn from others, gain ideas, and improve your business whether you're a grower, processor, or a technology supplier like me.

At the end of January, I ran into Terrence Bueckert of Beaver Creek Farms at Manitoba Potato Production Days in Brandon. They grow 9,000 acres of crops including 1,000 acres of potatoes near MacGregor in central Manitoba. Because of Terrence's experience with potato planting, I really value his perspective on how seemingly small adjustments can make a significant difference to potato production. So, I followed up with him to share his thoughts here:

"We mounted RiteDepth sonar sensors on our Lockwood Planter for depth control last year. In the past, we had certain situations where we struggled a bit maintaining depth. When this technology came along, well, sometimes you're hesitant in starting a new electronics application, but in this case we figured it seemed simple enough to install and try.

"In the past, we've had inconsistent emergence because as the planter gets emptier, it has less weight. When we added extensions to our planter's hoppers we noticed more how the planter rides deeper when it's full of seed compared to empty. The sonar sensor measures the distance from the ground to the frame, so it maintains the correct distance whether it's empty or full.

"Same goes for wet ground. Last year, we planted when much of the field was ready to go but we had to muck through some frost boils. In the past, the machine just goes down and the seed can get quite deep. The wet areas are always colder ground too, so sometimes you can get seed rot when the seed goes too deep. With the sonar control, the planter compensates for the soft areas and maintains proper depth.

"The other thing I liked is the manual depth override. In situations where you want to go shallower or deeper, it's a simple toggle on the box in the cab. In general, the technology is user-friendly: we're pretty handy so we had no issue installing and using it, and it's a simple menu.

"We're only one year in, but we definitely saw more consistency at emergence. We haven't tracked all the way to harvest to find out how much of a yield difference it makes because there are a lot of other factors at play over the season. It's not necessarily a game changer but I do think it all factors in. As farmers, the pursuit of excellence is always on our minds. If we can see an evenly emerged field, we can see that's one area we were able to manage.

For us, there's no turning back. We definitely see value in it."

Thanks for your thoughts, Terrence. ○

SEED & POTATO VARIETIES
Marketing Potatoes to Today's Consumers

PAUL SAWATZKY Business Development Manager • Parkland Seed Potatoes • parklandseedpotatoes.com

It's easy to fall into the trap of thinking the only way to potato farming success is to produce *more*. While yield is absolutely a priority (and new varieties with higher yield potential and ever-better agronomics are constantly being introduced), building a healthy potato industry into the future depends on marketing higher value product. How? As an entire value chain, we — seed companies and growers, primary producers, processors and retailers — need to focus on nurturing consumer interest in potatoes.

Twenty years ago, the starch on an average Canadian dinner table tended towards bulk-purchased russet or yellow potatoes, simple white rice, or basic, all-wheat noodles. Now, Canadians are opting — and paying significantly more — for specialty rice (think: basmati, jasmine, wild, red, black, brown, Arborio), specialty noodles (gluten-free; quick-cook; lentil-, rice-, or corn-based; plus a plethora of ethnic options), and increasingly popular alternatives like quinoa, couscous, teff, bulghur, and more.

Consumers are daily showing that basic and bulk is out; speciality and tailored to specific needs are very in. To maintain and hopefully grow market traction, the potato industry needs to meet today's consumer priorities.

Already, we've made huge strides forward as an industry. In the last handful of years, many companies have done great work in jazzing up packaging, including marketing smaller amounts of product. And, I'm pleased to see mealtime-inspiring options — pre-washed and chopped, ready to roast potato/veggie mixes; ready-to-microwave packaged potatoes; and pre-foiled easy-oven bake russets — now front and centre in grocery stores.

However, there's still room for lots of improvement. Today's consumers see value in differentiated product: single-meal portions, convenience and easy-cook options, health-based marketing, organic options, and 'foody' alternatives (think purple-fleshed, fingerling, or multi-coloured). Yet, the vast majority of fresh potatoes are still marketed from a price-point perspective, in relatively large bags and under basic red/yellow/russet banners.

As an entire value chain, let's collaborate on how to make potatoes more attractive to consumers: to better market to young people, to create new packaging and product options, to promote the health benefits of potatoes, and to bring forward new varieties.

Need proof it can be done? Consider sweet potatoes. A generation ago, sweet potatoes were a Thanksgiving and Christmas dinner, otherwise ignored, side dish. Now, sweet potatoes are enjoying ballooning market share because they've been expertly marketed as a "healthier alternative."

Potato production can only get so cheap, so focusing on decreasing the costs of production will only go so far. And, there are a limited number of consumers who want to purchase in bulk, so focusing primarily on producing more volume will cannibalize sales within the industry and drive down prices. A more sustainable priority is to excite consumers, both to increase returns on the potatoes we're already producing and to promote overall growth in the industry. It's time to get a little more creative. ○

POTATO STORAGE

Huge Steps Forward in Potato Storage Design and Innovation

CHAD KLEISINGER Business Development and Product Manager • Meridian Manufacturing Inc. • www.meridianmfg.com

Given that technology and innovation are changing every part of agriculture, it's not surprising that there have been big strides in a potato storage's design and technology too.

We're now able to build bigger buildings than ever. Over the past ten years, leading manufacturers have been able to significantly increase the tensile strength (KSI) of steel buildings and build in heavier gauge due to improved manufacturing technology and equipment. Because of the stronger steel, we've been able to stretch buildings longer and wider, overcoming previous concerns about snow load, wind damage, or potatoes pushing walls out. Three hundred, four hundred or five hundred feet or more is no longer a challenge for some building manufacturers. That's great news for potato producers, since it is much more cost-effective for farmers to construct and manage fewer, larger storage buildings than a greater number of smaller buildings.

Potato storage buildings now come in innovative shapes and designs too. While arch style buildings are fairly common, a brand-new option is a large span arch design with fan houses and walkways through the centre. The benefit of the large span arch is three-fold. The centre position of the fan house changes the dynamics of air, allowing easier aeration throughout the stored product and achieving really good penetration of fog or nip sprays. The double bay design allows double the volume of storage within a single structure. And, the central walkway means inventory can be comfortably seen and easily assessed without anyone stepping on the stored product.

Speaking of, I'm very happy to see that central walkways, catwalks and viewing platforms are becoming increasingly common across all bin styles. Walking across the potatoes is a significant safety risk to the individual and introduces all kinds of contamination risk to the product. Just think: if you or one of your staff happens to accidentally have a screw in a boot from being in the mechanic shop five minutes before, that screw could lodge in a tuber and become a liability come processing. It's not surprising that processors are becoming increasingly concerned about this and other kinds of contamination and are pushing growers away from walking on their piles.

One other area of building design that has really changed in recent years relates to building and environmental codes. We are seeing much tougher codes virtually across the country, which occasionally limits options for some farmers. Turn to any experienced building manufacturer to help you navigate the revised and tightened codes.

While I understand that not everyone gets quite as excited about potato storage and design as I, the whole industry should celebrate the important steps forward our storage manufacturers are making every day! ○

POTATO EQUIPMENT

Top Tips for Optimal Planting

DARYL BOUCHARD Store Manager • Lockwood Manufacturing · lockwoodmfg.com

With the 2019 planting season just around the corner, I'd like to share some of my top planting tips to help you maximize your yields and profits. The success of your potato crop all starts with how well it is planted.

Before you fill your planter and head to the field, it's important to check for worn parts. In addition, make sure opener plows are built up or replaced — this is crucial for maintaining proper seed depth.

Optimal seed spacing is important to maintain a more uniform size profile for seed, table, and processing markets.

Ground speed is very important for proper seed spacing. We all like to plant faster than we should; however, this can cause problems. No matter the spacing — whether you're planting at 7 inches or up to 18 — when seed pieces make contact with the ground at higher ground speeds, they have a tendency to roll, which creates uneven spacing. Good seedbed prep will also improve seed spacing.

> Potato planter performance in the field is directly affected by seed preparation.

Additionally, check that soil isn't flowing forward and changing your seed depth at different ground speeds.

Make sure covering discs are adjusted properly to the correct angle so that they don't disrupt the granular fertilizer bands. The fertilizer band must be 3 to 3½ inches to each side and 1½ to 2 inches below the seed piece.

Pick planters will help hold seed pieces in place on rolling ground. Belted cup planters require more blocky seed pieces to prevent rolling, while air cup planters hold seed pieces in the cups with suction. All three planter types will do an excellent job at spacing if your seed profile is cut properly — try to maintain a nice blocky seed profile.

Lockwood has introduced height sensing on its new planters, which controls fertilizer and seed piece placement depth whether the planter is loaded or empty. When they are full, most planters will plant seed pieces deeper. Additionally, individual row shutoff, a patented Lockwood planter feature, aids in ensuring appropriate seed placement and spacing when making turns.

Last but not least, make accurate adjustments to your seed cutter. Potato planter performance in the field is directly affected by seed preparation. If you believe your operation's seed preparation, planter performance or seed spacing could be improved, contact your equipment dealer to optimize your planting results. Once seed is in the ground, you can't make changes until next year. ○

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European launch of "Imagine a World Without Potatoes" campaign in Belgium, November 2018.
PHOTO: ANDRE DEVAUX

On the Campaign Trail

CIP's campaign is inspiring the world about potatoes. BY TREENA HEIN

IN SOME REGIONS of the world potato consumption has stagnated in recent years. There are several thorny reasons for that, says Peter VanderZaag, president of Sunrise Potato Storage in Alliston, Ont., and a professor at Yunnan Normal University in Kunming, Yunnan Province, People's Republic of China.

"In the media, potatoes get a bad rap in many ways," he asserts. "There is lots of information out there about how they are fattening, they are high-carbohydrate, they don't have a lot of nutrients."

To combat the worldwide decline in potato consumption, it makes sense to take a worldwide focus. That's the view of leadership at the International Potato Center (CIP), which launched a global awareness campaign in May 2018 at the 10th World Potato Congress.

The initiative is called "Imagine a World Without Potatoes," and it "invites millions of potato consumers around the world to imagine life without the potatoes they are so used to having around them in all their varieties and presentations."

At the launch, Barbara Wells, CIP's director general, said the campaign is intended "to raise awareness of the incredible biodiversity of potato and how it can offer solutions to the global challenges we are facing such as climate change, food security and development." She added that "to safeguard the future of potato, we need to continue supporting efforts to maximize the crop's potential, boosting production, encouraging scientific research and promoting consumption."

The problem is not that potato fails to inspire, said Marc de Beaufort, CIP marketing specialist, "but that we take it for granted."

ONE MESSAGE, A THOUSAND VOICES

To be a success, "Imagine a World Without Potatoes" seeks to bring together diverse partners across the global potato sector: private companies, trade associations, public research institutes and more.

Each campaign partner is free to develop their own strategy with the campaign materials and messages, from including the logo on product packaging to events and social media use. The idea is that many different institutions and players around the world employ their existing marketing power — and their creativity — to help convey the central message. Creative ideas might include, suggests CIP, packing popular potato products in black wrappings for a period of time in grocery stores, competitions involving videos portraying life without potatoes, and planting potato gardens at schools.

CIP notes that similar types of campaigns have shown success. For example, in Columbia in 2014 after 50 years of conflict, negotiations were going on between the government and left-wing guerrillas. To promote the peace process, over 200 companies, sports clubs, universities and religious organizations took part in the "Soy Capaz" (I Can) campaign.

During this initiative, partners used the colour white in the packaging of their most popular products and different variations of the phrase "as a message that expressed the need for society to take part in the complex process of peace building." It worked, helping boost the process by unifying Columbians behind it.

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Romain Cools, president of the World Potato Congress, addresses delegates at the campaign launch in China.
PHOTO: PETER VANDERZAAG

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To take part and support its campaign, CIP asks partners to provide USD $5,000. This is used to cover the creation of marketing materials and also current operational costs, which includes CIP actively sharing each partners' events and other activities on several digital platforms. Also included in the fee is an initial meeting with the campaign director to discuss possible needs and go over examples of how the campaign is being applied by others.

CIP says having globally posed the question of what the world would be like without potatoes, "we will have laid the groundwork to make consumers more receptive to the many educational campaigns that promote the qualities of the potato."

Once their curiosity about the potential of the potato has been raised, CIP believes "they will be more receptive to the messaging led by the private sector and potato associations around the world that explain the potato's nutritional and economic benefits."

The importance of potatoes in helping feed 10 billion people by 2050 was discussed at the European launch of the CIP campaign in Belgium in November 2018. Campaign creator Andre Devaux, who was CIP's Latin American regional program director and now is an international advisor at the World Potato Congress, gave a presentation emphasizing how important partnerships are (among research institutes, private industry, governments and NGOs) in potato promotion.

Devaux also highlighted CIP's efforts to produce more nutritious potatoes and develop new potato products, and stated that "huge progress" has been made in developing better-adapted and more resilient potatoes in different regions of the world (for example, the Kinigi variety in Rwanda).

VanderZaag echoes the sentiment that potatoes will be important in future global food security.

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"No crop produces more protein — potatoes have all the essential amino acids except two — and out-yields corn, wheat and rice per unit of area, time and water," he says. "As land becomes more scarce and water availability becomes more of an issue, the potato will grow in significance."

VanderZaag traveled to China last year to attend the launch of the CIP campaign in Asia, and says China is currently the largest potato producer on the planet. "People in the mountains there, if you asked them to picture a world without potatoes, they would say it's completely impossible, just as they would say the same in countries like Peru and Ecuador. But if you go to cities like Shanghai or Beijing, it's a more diversified diet."

He reports that to support Chinese farmers in the mountains to have a stable, good income and to boost potato consumption, China's president is now decreeing that potatoes have to be present on menus in cafeterias and other locations. There is also a new potato recipe book that's been released in China, VanderZaag says, adding the government is also discussing making potatoes an official food of the Winter Olympics in 2022, which will be held in China.

Here in Canada, the campaign has yet to begin, says United Potato Growers of Canada general manager, Kevin MacIsaac. The first time he learned about the initiative was at a meeting in late 2017 in Prince Edward Island. "We had lots of questions and needed some time to think about the opportunity," he says. "I would say the next big step was seeing the [campaign] booth in Peru at the World Potato Congress. [We] agreed to turn the project over to the National Marketing Committee of the Canadian Potato Council."

In late January 2019, MacIsaac says there was a conference call to determine which provinces might be interested in moving forward with becoming part of the campaign. De Beaufort was on that call.

"I was impressed when de Beaufort said they now have 60 partners in 60 countries," says MacIsaac. "Many of these are major worldwide companies like McCain, Pepsico and Bayer, and also some industry support organizations like Belgapom. We were a little surprised that the U.S. has not really signed on yet. Our next step in Canada is to see who wants to put up the $5,000 membership fee to move forward." ○

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Combatting Common Scab

Three Canadian potato experts share their views on the best ways to tackle the disease.

BY MARK HALSALL

KHALIL AL-MUGHRABI

Pathologist for the Potato Development Centre at New Brunswick's Department of Agriculture, Aquaculture and Fisheries.

ROBERT COFFIN

Private potato breeder based in Ontario.

EUGENIA BANKS

Potato specialist with the Ontario Potato Board.

COMMON SCAB, a bacterial disease that doesn't affect yields but causes ugly lesions and cavities on infected tubers, which can render them unmarketable, is a pervasive threat in potato-growing areas across Canada.

It has likely been around for as long as people have been growing potatoes, but researchers are still trying to determine why the pathogen is much more common in some fields than others and what the best methods are for combatting common scab.

While growers are using a number of different practices to try to control the disease, none of them have proven to be totally effective. In this edition of Roundtable, three potato industry experts — Khalil Al-Mughrabi, a pathologist for the Potato Development Centre at New Brunswick's Department of Agriculture, Aquaculture and Fisheries; Robert Coffin, a prominent private potato breeder in Trenton, Ont.; and Eugenia Banks, a potato specialist with the Ontario Potato Board — weigh in on common scab management practices offering the best chances for success.

PRIORITY DISEASE

Al-Mughrabi has participated in numerous studies on common scab management practices which include the use of biopesticides, fungicides, soil additives and soil fumigants, as well as experimental measures such as the use of compost and compost tea and a chemical compound extracted from quinoa seeds.

Al-Mughrabi says that common scab is an economically important disease of potato not just in Canada, but around the world. Infected tubers show superficial, raised, or deep-pitted brownish lesions, which ultimately reduce the quality and marketability of both fresh market and processing potatoes.

"Common scab has been identified by stakeholders across Canada as a priority disease for which adequate control measures are lacking," he says, adding the disease is most prevalent in Eastern Canada.

> "Common scab has been identified by stakeholders across Canada as a priority disease for which adequate control measures are lacking."
>
> KHALIL AL-MUGHRABI

Al-Mughrabi says common scab is known to be caused by the pathogen *Streptomyces scabies*, but other less common pathogenic species of *Streptomyces* may also be involved.

"There are hundreds of bacterial species in the *Streptomyces* genus that seem to be found in most soils. This could explain why a potato cultivar may not be affected by common scab in one area, but have severe scab when planted in another area," he says.

According to Al-Mughrabi, common scab is almost always transmitted to fields through infected seed pieces, although it can also be spread by spores in the soil, in soil water and possibly on nematodes

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or insects. Once the disease is established in a field, the scab pathogen will survive on infected crop residue buried in the soil even under harsh environmental conditions, making it very difficult to eradicate or manage.

In many areas of Canada and the United States, soil fumigants such as chloropicrin are routinely used to treat scab infections in processing and table potatoes. Al-Mughrabi says some growers use fumigation in an effort to control potato diseases like early dying, but fumigants have also been shown to reduce common scab, Rhizoctonia and a number of other soil pathogens.

Al-Mughrabi says that biopesticides have also been shown to suppress common scab, referring to a recent study which reported a biopesticide containing *Bacillus subtilis* reduced common scab by 56 per cent.

Al-Mughrabi offers the following suggestions for growers looking for ways to manage common scab in their fields.

Potatoes infected with common scab.
PHOTO: KHALIL AL-MUGHRABI, NBDAAF

Potato infected with common scab.
PHOTO: KHALIL AL-MUGHRABI, NBDAAF

CLEAN SEED

Plant clean, certified, disease-free seed.

CHEMICAL CONTROL

A broad-spectrum chemical seed piece treatment may provide some control. For example, a recent study reported that fludioxonil reduced common scab by 58 per cent. However, chemical treatments are no substitute for clean, disease-free seed.

RESISTANT VARIETIES

Planting scab-resistant potatoes can be one of the best options, if the cultivar fits the potato operation. However, no varieties are completely immune to common scab. Avon, Cherokee, Chieftain, Hilite Russet, Huron and Wauseon are all considered highly resistant varieties.

COVER CROPS

Growing cover crops such as mustard can be useful. Mustard acts as a biofumigant that can potentially control various soil pathogens, as long as it is han-

dled correctly (mustard has to be chopped and mixed into moist soil in order to be effective).

CROP ROTATION

A three- to five-year rotation of crops is important, as continuous cropping of potatoes in problem fields can lead to increased disease severity. Non-host crops like alfalfa, rye and soybeans are considered good rotational choices. Plowing down legumes or red clover may encourage common scab development.

ORGANIC MATTER

Crop rotations and soil management practices that favour the increase of soil organic matter can be used to maintain soil moisture during tuber development. The activity of the common scab organism is known to be inhibited in moist soils.

SOIL MOISTURE

If available, irrigation at tuber set (4 – 6 weeks after planting) can help maintain adequate soil moisture. It's been reported that increasing soil moisture to 80 – 85 per cent during tuber initiation until tubers are 1-1.5 inches in size can reduce common scab incidence.

SOIL PH

Common scab is most common in soils with pH 5.5 – 7.5, so as a general rule it's advisable to avoid liming to a point where the soil pH exceeds 5.4. Disease incidence may be reduced by applying acid-forming fertilizers such as ammonium sulphate, which can lower soil pH. Similarly, if soil calcium is required, gypsum can be applied without raising soil pH. Manganese may lower scab incidence without elevating soil pH. However, lowering the soil pH may affect the choice of rotation crops and can alter the availability of certain soil nutrients.

SOIL ADDITIVES/AMENDMENTS

Applying large amounts of farmyard manure in problem fields should be avoided, as this will provide a food base for the common scab organism. Applying mustard meal and saponins extracted from *Chenopodium quinoa* can reduce common scab incidence and increase marketable yield.

Al-Mughrabi maintains an integrated approach that combines different management methods is better than relying on a single practice.

"Chemical control is not sustainable as pathogens can develop resistance to them very quickly," he says, adding that using a resistant variety is a good management tool but it may not be an option if it doesn't fit a potato operation and the types of varieties required by some end-users.

"Cultural practices such as crop rotation, soil pH, water management, and incorporating biofumigants [like] mustard will aid in the success of disease management. This way if one approach fails to achieve control, other approaches will help," says Al-Mughrabi.

Shepody potatoes infected with common scab.
PHOTO: ROBERT COFFIN

Common scab research plot in the Alliston, Ont., area.
PHOTO: EUGENIA BANKS, ONTARIO POTATO BOARD

INFESTED FIELDS

Robert Coffin and his wife, Joyce Coffin, are long-time Prince Edward Island potato breeders, but in November the couple decided to pull up stakes and start a new breeding business in Trenton, Ont. The Coffins have a lot of experience dealing with common scab because their potato fields at Privar Farm in North Wiltshire, P.E.I., were rife with the disease.

Coffin says he and his wife started their first potato breeding operation on the Island on dairy farm land that had been farmed for 200 years.

"We had no problems with scab there. Then we shifted our farm operation to another location in

Prince Edward Island where we cleared land out of the forest, and we were totally surprised to see we had serious scab [problems]," he says.

"The thing that told us right off the top was that you don't necessarily have to have a previous history of potato production in order to have scab. The organism can already be there."

Coffin says he tried a number of cultural practices including different crop rotations to try to get the common scab under control without much success.

"There are some certain crop rotations that have been suggested might help. But on our farm, we tried a number of different crops, including oilseed radish, oats, barley, clover, winter rye and hot mustard, and it didn't seem to have any effect on the severity of the scab," he says. "It was there just year after year."

Coffin says if his crop rotation trials had taken place on land that wasn't under severe common scab pressure, the results may have been different. "If scab pressure is only moderate, you might see some improvements," he says.

A few years ago, Privar Farm participated in a study that evaluated a product containing several types of bacteria and its efficacy in suppressing common scab. In the first year, Coffin says, the biopesticide, which was applied in-furrow at planting, exhibited good control but in two subsequent years of trials the results were inconsistent.

Coffin believes at the present time, planting resistant varieties and soil fumigation probably provide the best defence for growers against common scab.

"We know that some varieties of potatoes have a fair amount of field resistance to scab," he says. "But at the same time, some of the ones that have the best resistance to scab may not have really desirable agronomic traits such as yield or processing quality. So that's the problem."

Coffin says soil fumigation isn't an option for potato farms in Prince Edward Island, where the use of fumigants have been banned since 2002 due to concerns over water quality. He also points out fumigation is an expensive solution and is only temporary, since fields can revert back to their original population of living organisms — which can include common scab pathogens — within a few years.

"Soil fumigation is not a permanent fix," Coffin says. "I think that's important to recognize."

GENETIC RESISTANCE

Eugenia Banks has conducted numerous studies on common scab control and also delivered presentations on the topic at potato conferences in both Canada and the United States.

The potato specialist with the Ontario Potato Board says field trials have shown registered seed treatments have little if any effect on common scab bacteria. Additionally, fumigation with chloropicrin has been shown to produce inconsistent results.

"It may reduce scab incidence in some fields but not in others," she says.

Banks says because common scab bacterium can likely survive indefinitely in the soil in the absence of potatoes, even an eight-year rotation has been shown to be ineffective as a control measure.

She points out that practices such as liming or spreading contaminated cattle manure on fields can favour the development of common scab.

Banks says growers can avoid introducing the common scab pathogen in their fields by planting healthy seed. She adds, however, even healthy-looking seed can carry the scab bacterium on the skin or in the lenticels.

Side-dressing with fertilizers containing sulfur like ammonium sulfate, she says, has been reported to reduce common scab severity.

Banks maintains "stable genetic resistance" is the most reliable and cost-effective strategy for managing common scab.

"Susceptible varieties such as Yukon Gold, Vivaldi, Chaleur, to name just a few, should be grown only in common scab-free soil. Varieties that are resistant or tolerant to scab like Pike, Superior, Gold Rush and Norland should be the preferred varieties in infested fields," Banks says. However, scab-resistant varieties are not available for all markets and in all growing areas. ○

SEPARATING SPECIES

A two-year research project on common scab in potatoes that's supported by the Ontario Potato Board is now in its second year. The project, according to Eugenia Banks, a potato specialist with the board, has already yielded an important breakthrough.

The finding from the first year of study is *Streptomyces stelliscabiei* is the most common species of common scab in Ontario — not *S. scabiei* as expected. Banks says this could lead to the development of common scab management practices that specifically target *S. stelliscabiei*.

"This is a significant finding because methods used to reduce common scab in other potato-growing areas may not work in Ontario," she says.

According to Banks, the majority of *Streptomyces* species found in agricultural soils do not cause common scab and only those species which produce a toxin called thaxtomin are pathogenic.

The 2018 research involved collecting 50 soil samples from potato fields in different parts of Ontario. A type of molecular analysis called polymerase chain reaction (PCR) testing conducted by A&L Canada Laboratories revealed 48 of the fields tested positive for the presence of thaxtomin-producing *Streptomyces* species and that most of them contained multiple species.

In addition to *S. stelliscabiei* and *S. scabiei,* two other pathogenic *Streptomyces* species — *S. turgidiscabiei* and *S. acidiscabiei* — were identified in the soil tests.

Banks says A&L Canada Laboratories will offer this testing service to Ontario growers with problem fields who want to find out which species of pathogenic *Streptomyces* are present.

The study could assist in the development of custom-tailored approaches to common scab control by adjusting management practices to the kind of bacteria found in individual fields, she says.

The soil tests showed there was a correlation between how much common scab bacteria is present and nutrient levels within a field. It also helped identify a number of factors such as soil fertility that could help predict levels of common scab in Ontario potato fields.

"This study provides important information to conduct field studies investigating the correlation between macro and micro nutrients and the pathogenic *Streptomyces* species present in a field," Banks says.

"The next step will be to determine if changing soil fertility results in changes in the bacteria present and reduces scab levels. The approach will depend on the species of *Streptomyces* present," she adds.

"For instance, increasing organic matter in a field infested mainly with *S. stelliscabiei* should result in a reduction of the population of this *Streptomyces* species."

In 2019, the focus of the research project, which is funded in part by the Canadian Agricultural Partnership, will be on assessing the effectiveness of biopesticides on controlling *S. stelliscabiei.*

Banks says as part of the project, she will also continue research she initiated several years ago on the use of horseradish as a soil amendment to combat common scab.

"I hope to incorporate macerated horseradish roots in a field infested mainly with *S. stelliscabiei,*" she says, adding that results should be available immediately after the field research is completed and the data it produces is analyzed.

Potato Breeding: A European Approach, Part III

Marcel Bruins, editor of *European Seed*, discusses the challenges and opportunities of breeding new potato varieties with the leaders of Europe's major potato breeding companies. BY MARCEL BRUINS

MARCEL BRUINS, editor of *European Seed*, sat down with the leaders of five major potato breeding companies in Europe to learn more about the challenges of breeding new potato varieties. Piet Smeenge, director of Kweekbedrijf Smeenge-Research; Vanessa Prigge, Crop Improvement project manager at Solana; Gerard Backx, CEO of HZPC; Jan-Paul Bandsma, product manager at de Nijs Potatoes; and Guus Heselmans, R&D manager of C. Meijer B.V., provided insight on this favoured crop.

DEVELOPMENT COSTS IN TIME AND MONEY

Of the European potato breeding companies interviewed, the experts said it can take from eight to 15 years to develop and introduce new varieties, and is often a risky undertaking.

From crossing to release takes C. Meijer B.V. about eight to nine years, says Heselmans, followed by first commercialization and multiplication, which carries a lot of financial risks as well.

Bandsma indicates it takes around 15 years to breed and introduce a new variety. "It is the time starting from the cross and selection and all the trial fields in The Netherlands and abroad. When the variety is in the registration process, we are setting up traditional stem selection and mini tuber production. This material is going to one or more growers. We estimate that it takes around €150,000 (C$228,000) to develop a new variety," he says.

It also takes Solana about 15 years from the initial cross to market penetration of a potato variety. "One major factor in this lengthy process is the slow rate of tuber production, both in the initial breeding process as well as later on during seed potato production needed for introduction into the market. If special trait loci from unadapted germplasm need to be introgressed, decades of research and pre-breeding activities may precede the variety development phase," Prigge says.

Backx shares that it takes HZPC about 10 years to select a new variety properly "and after that, we need five years to introduce a variety and to create planting material. That is a slow process," he says. Breeding a new variety for variety introduction costs around €3 million (C$4.5 million), he adds.

Smeenge says his company, Kweekbedrijf Smeenge-Research, comes in at similar numbers. "We need 10 to 14 years and between €2 – €3 million per new variety."

It can take from eight to 15 years to develop and introduce new varieties, and is often a risky undertaking.

FUTURE PRODUCTS: MEETING GROWERS' NEEDS

When considering future products, Smeenge says his company considers the needs of many stakeholders. "We try to think and talk about the wishes for the future with all the clients: growers, packers, consumers, industries, et cetera. It is difficult to look 14 years into the future," he says.

Backx says HZPC must make sure its varieties are aligned with what customers want. "And that is not in the first place the grower. The grower is second or third, I would say. We need to predict what we think consumer preferences are. Therefore, we need to communicate with them, we need to analyze market trends, et cetera. A lot of marketing work is spent on that."

Solana has its roots in agriculture and has always had a very close tie to growers. "However, in potato we need not only take the growers' demands into account, but the end consumers are equally relevant, and these are individual consumers in the supermarket as well as packers and the processing industry," Prigge says.

"At the Solana-Group, breeders work very closely with product managers and area sales managers and the feedback goes in both directions, thus influencing the whole breeding process from the choice of crossing parents to the final selection decisions and relevant markets for introduction," she adds.

Nijs Potatoes first considers what its customers and clients want, says Bandsma. "When they are happy, mostly based on results from abroad, we are setting up multiplications. The growers look at tuber count, resistances against diseases, strong against heat and drought, strong against damaging, but most important is how much money they receive per hectare. Also, the maturity of all the varieties they grow, is very important [depending on how many hectares a grower grows]."

Heselmans says as a breeding company, C. Meijer B.V is active along the whole chain, both to introduce and support its varieties. "It is important a selection program is designed in such way that practical cultivation of the candidates is predicted in a proper way, both for common practices and for divergent situations like drought stress and high disease pressure."

BIGGEST CHALLENGES WHEN DEVELOPING VARIETIES

Backx says the biggest challenge a breeder has when developing new varieties is finding the correct compromise. "You never find a variety with all the required characteristics. But the total package needs to be close to what is required for that market segment. Understanding the needs of the customers is very important," he says.

Bandsma maintains the biggest challenge for a breeder is to look into the future. "You want a variety for a specific market and it takes around 15 years to breed it. When you are going to introduce the variety, is it still what the market wants?"

Prigge identifies three major challenges for breeders. "First, we deal with [too] many commercially relevant selection traits which limits the selection intensity per trait to less than 50 per cent and requires constant compromises in the choice of parental combinations.

"Second, the low tuber multiplication rate [<15 for potato versus, for example, 1000 for rapeseed] leads to a lengthy breeding cycle and only allows assessment of complex traits at later stages, while the early selection decisions are based on visual assessment of one or a few plants and traits with low heritability.

"Third, the tetraploid and highly heterozygous nature of the crop makes working with recessive traits tedious and fixation of favourable allele combinations almost impossible, while fostering a high genetic burden due to hiding of deleterious alleles in the tetraploid genome."

Smeenge concurs, stating that his biggest challenge is to present the right variety at the right moment for the right market.

Heselmans emphasizes that it is not the development of the variety itself, that it is not having the variety registered for plant variety protection (PVP) or value for cultivation and use (VCU), but that it is to have the variety grown to a serious commercial value. According to Heselmans, this is not a breeding effort, but a company effort.

Predicting market demand sometimes 15 years into the future can be a challenge.

IN THE PIPELINE

For Solana, pipeline innovations are haplotype-based breeding, genomic selection, gene editing, and likely F1 hybrid breeding with diploid inbred parents, says Prigge.

Smeenge concurs: "In the pipeline are hybrid breeding, genetic modification [cisgenesis], Crispr-CAS and molecular selection."

Bandsma says FOBEK (and other shareholders) are developing marker technology to trace if there is a certain gene/resistance in a seed line/variety. "By this innovation we exclude more seed lines which do not have a certain gene/resistance. Also, this could be an advantage for selecting seed lines/varieties for making new crosses," he says.

According to Heselmans, innovation in itself is not a goal but using innovation to accelerate your breeding program in speed, magnitude and quality is the key. "Breeders nowadays have a whole range of possibilities in this area. More and more knowledge on potato genetics can be obtained, also in-house with all kinds of DNA platforms and approaches available.

"However, we have to realize that potato has 40,000 genes in many allelic variants with still unknown interactions. The best innovation is to make best choices in investment of people, time and money on the DNA oriented approach in balance with an efficient, reliable and fast field selection; a balance between genotyping and phenotyping," he adds.

The big question is whether the hybrid varieties will lead to better and marketable varieties in the coming decade, says Backx. "Once that will work, can we produce true potato seed of those varieties? This will lead to a possibility to enter markets we cannot enter at the moment. Out of the 19 million hectares of potatoes in the world, most growers do not get proper seed potatoes or proper varieties. This is due to phytosanitary, political, or logistic barriers."

There are many challenges European companies must overcome when breeding and commercializing new varieties.

BREEDING AND COMMERCIALIZATION HURDLES

There are a number of challenges to overcome when breeding and commercializing new varieties, says Backx. “First of all, new breeding technologies — and not being able to use them. Secondly, the limitation to transport tubers from one area in the world to other areas. Thirdly, the number of countries with no breeders’ rights or no respect for breeders’ rights, and, lastly, the difficult procedures to require variety registration.”

Smeenge agrees. “It is a pity that the protection of breeders’ rights is not yet well regulated in parts of the world. Most of the countries in the world are UPOV members, but in many countries, there is no organization for the control of breeders’ rights,” he says.

Heselmans shares that PVP regulations, in most cases, are well organized, but as a breeder of a vegetatively multiplied crop, illegal multiplication is the biggest hurdle. “This income reduction gives pressure on research budget, thus further development,” he says.

Bandsma says he hasn’t experienced any hurdles in breeding. “A hurdle in commercialization can be the competition with varieties which are in the same market. Also, a problem in commercialization can be that suddenly expressions show up in a new promising variety which we didn’t expect. These things mostly appear when a variety is grown on a bigger scale.”

Prigge believes the biggest hurdle is the regulatory insecurity concerning new breeding technologies like gene editing. “We are almost set to apply these new tools to develop custom-made varieties having benefits for growers, consumers and the environment, but before even thinking about commercialization, we need the guarantee that these new products will not be regulated as GMO.” ○

MARKETNEWS

February figures show potato storage holdings in Canada are down significantly from the same time a year ago.

POTATO STORAGE HOLDINGS in Canada totaled 56.9 million hundredweight on Feb. 1, a 9.2 per cent decline from the same time in 2018, according to the United Potato Growers of Canada.

Storage holdings were down in every potato-producing province except for British Columbia, where holdings were up substantially at 36 per cent. According to UPGC General Manager, Kevin MacIsaac, British Columbia's crop was below average last year so the increase returned that province to normal stocks.

MacIsaac said in mid-February the reduced numbers across most of the country were a direct result of last year's cold, wet harvest season in many parts of Canada that limited the amount of potatoes going into storage.

MacIsaac said both British Columbia and Alberta reported increases in fresh holdings on Feb. 1 from a year previously, but he noted the two provinces were smaller players in Canada's fresh potato sector.

All of the other provinces reported reductions in fresh holdings, with New Brunswick leading the way with a 36.6 per cent decline from the same time a year ago. The result, according to MacIsaac, was fresh packing sheds would not be able to run as long as they'd like to.

On the processing side, every potato-producing province reported fewer holdings on Feb. 1 than the same time in 2018. MacIsaac says that has meant processing plants have had to ship potatoes in from outside the country.

"Since late fall, we have potatoes moving into Canada from Idaho to accommodate this need for processing potatoes," he says, "and the number there is pretty significant — 4.4 million hundredweight."

KEVIN MACISAAC

"Since late fall, we have potatoes moving into Canada from Idaho to accommodate this need for processing potatoes."

MacIsaac said the storage situation for fresh and processing potatoes has produced good prices as a result of strong demand. He added that higher prices haven't necessarily meant higher profits for many potato growers, who as a result of 2018's difficult harvest ended up with less crop than they hoped for.

"Unfortunately, the growers this year don't have the volume of potatoes that they need to meet this demand, so they're really not going to be able to capitalize on some of the extra dollars that would be in the price this year just because they don't have enough product," MacIsaac said.

According to MacIsaac, the storability of the 2018 potato crop has been a concern throughout the current storage season.

"In every area this year, there are issues with storability. Potatoes are having to be moved out sooner than they normally would be, just because of some storage issues all related to a wet, cold harvest," MacIsaac said.

"There's an old saying that 'you can't make a potato any better than what you put into storage, no matter how high the quality of storage you have.' So that's the issue, and it's ongoing."

Storage holdings for seed potatoes were down 242,000 hundredweight or 2.7 per cent on Feb. 1 from the same time in 2018. MacIsaac said seed potato holdings were up in Alberta, Canada's largest producer, as well as in Quebec from a year ago, which helped mitigate declines in other provinces.

MacIsaac maintained the seed holdings were more or less in line with what will be required for planting this spring.

"There may be some varieties that growers may not be able to find, but overall I think we're going to come in pretty close to what's needed," he said.

According to MacIsaac, some varieties of red and European yellow potatoes might be in short supply in 2019, but that won't be the case with the most popular spud in Canada. "There will be lots of Russet Burbank seed available," he said.

SOUTH OF THE BORDER, figures released by the United States Department of Agriculture in February showed storage holdings were up three per cent from the same time the previous year.

The 13 major potato states held 213.9 million hundredweight of potatoes in storage on Feb. 1, 2019, according to the USDA figures. Potato storage holdings on Feb. 1 in 2018 totalled 208.6 million hundredweight. ○ MARK HALSALL

Canadian Potato Storage Holdings (000 cwt)

	2019 Feb. 1 Holdings				2018 Feb. 1 Holdings				
Province	Fresh	Process	Seed	Total	Fresh	Process	Seed	Total	Total Holdings % Change
Prince Edward Island	3,395	9,417	1,677	14,489	3,977	10,139	1,902	16,018	-9.5
New Brunswick	977	6,131	1,645	8,753	1,542	6,425	1,829	9,796	-10.6
Quebec	2,739	2,161	1,253	6,153	2,771	2,788	1,147	6,706	-8.2
Ontario	764	2,352	105	3,221	951	2,572	129	3,652	-11.8
Manitoba	754	8,110	1,241	10,105	1,096	9,196	1,593	11,885	-15.0
Saskatchewan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alberta	604	10,243	2,700	13,547	539	11,200	2,264	14,003	-3.3
British Columbia	461	0	193	654	289	0	192	481	36.0
Total Canada	**9,694**	**38,414**	**8,814**	**56,922**	**11,165**	**42,320**	**9,056**	**62,541**	**-9.0**

SOURCE: AGRICULTURE AND AGRI-FOOD CANADA/UNITED POTATO GROWERS OF CANADA

eye on the nation

ALBERTA

Terence Hochstein, Executive Director,
Potato Growers of Alberta

As Alberta waits for spring to begin, we can look back on a very different winter. Not many growers can remember the last time the whole province went 25 – 30 days straight with -25 to -40 degree temperatures. Now that that is hopefully behind us, the growers are eagerly awaiting the snow to melt and the soil to warm up in order to begin field preparations for planting. There is seed starting to move south, with the coming weeks anticipated to be very hectic.

With the unfortunate situations in Manitoba and Prince Edward Island this past season, any overage that was produced in Alberta has found a home out of province. The continued encouragement amongst all growing areas to only produce to contract would have been very evident this year for Alberta growers as we would have had a large amount of overage with no home if not for the role that Mother Nature played in other areas of North America. The message remains the same again this year, only grow to your contract requirements as overage has very little value without a home.

With the new Cavendish plant in Lethbridge scheduled to open in July – August 2019, it is anticipated that an additional 6,500 acres of processing potatoes will be planted this spring in Alberta. This will not only meet the needs of Cavendish but any other adjustments that McCain's and Lamb Weston may make.

The annual AIPA Burgers and Beans and the PGA Golf Tournament are scheduled for July 10th and 11th. For more information please call the office.

Safe planting for everyone across Canada.

BRITISH COLUMBIA

Hugh Reynolds, Reynelda Farms, Delta, B.C.

After a snowy February and early March, growers were finally able to get their Warbas in. There has been little rain and so the fields are dry enough to plow and now the temperature is finally warm.

The B.C. seed growers are grading fast as the quality is high with low disease and virus. The fresh growers are still shipping hard with large potatoes at fair prices. While this takes skill, it also needs luck which we had last year. B.C. growers are buying steel to help us plant and harvest faster as we know that it is only time until we get the bad weather. Good luck to all in the coming year.

QUÉBEC

Clément Lalancette, Directeur General,
Les Producteurs de pommes de terre du Québec

The 2018 – 2019 marketing season has been a challenging one for Quebec's growers and it is not over yet! The wet and cold harvesting period impacted the quality of potatoes in storage and some growers had to throw potatoes away. The dry summer had an impact, too, on the quality, with the result of smaller tubers and less "chief" potatoes. Almost 2,000 acres had to be left unharvested. The weather explained in large part the very low production and inventory in Eastern provinces (57 M/cwt, instead of an 59 M/cwt average).

The good side of this situation, with such a limited production, is the price increase in the fresh market and for open potatoes for growers with over contract volume. The processors and packers were all looking for potatoes, but there was more demand than offer.

The bad side of this situation was the fact that some growers had difficulty paying their bills because they had a very poor crop. The risk protection programs did not work perfectly to help them and we are still evaluating the situation.

The big question for the next marketing season is will we see an important acreage increase after such good prices? Probably, but seed availability could reduce this increase.

NEW BRUNSWICK

Jean-Maurice Daigle, Director of Market
Information, Potatoes New Brunswick

The New Brunswick 2018 crop is storing well with a few issues and growers are keeping a close eye on the storages. With the early frosts, wet fall and potatoes left in the field, this year's crop is very different than crop 2017. Lower yields, lower payables and rough, immature tubers have caused supply within the province in all sectors to be tight.

Processors are running at or above stated capacity due to the tight supply of raw product throughout the world.

Fresh table potato packers are also struggling with quality and a limited supply of raw. All indication points to packers running out of supply before the availability of new crop. Potato prices are higher than average, but this is mainly due to a lack of supply.

The N.B. Seed Potato Growers' Association held their annual N.B. seed potato day on February 28, 2019, in Grand Falls, where growers and industry representatives meet for a full day of discussions around current issues, best management practices and research results in order to continue to make the New Brunswick Seed Potato Industry a leader in the production of high-quality seed potatoes.

MANITOBA

Dan Sawatzky, General Manager,
Keystone Potato Producers Association

As I write this snapshot of what I am seeing in the Manitoba potato world, both Simplot Canada and McCain Foods are busy with capital projects. Simplot is on track with the construction of a new plant adjacent to their Portage location doubling their capacity and adding to their ability to produce specialty products. McCain is near the end of a three-week shutdown in Portage to replace and upgrade equipment and add to their raw receiving ability.

The past few days in mid-March have seen temperatures climb to freezing, providing some relief from the below normal temperatures in February. Snowfall has been above normal which should result in adequate runoff to fill reservoirs that were added or expanded in preparation for the increased acreage needed to supply the additional plant capacity. High River levels are being forecasted which will result in some flooding of low-lying areas.

Holdings of old crop are down in both the fresh and processing sectors. Dry conditions in the fresh growing area reduced yield by about 30 per cent while a difficult harvest weather and frost limited process production. Strong demand is also drawing down stocks. Potatoes continue to be imported to supplement supply and extend factory run time.

With Manitoba being one of the few areas in North America without pricing in place for the 2019 processing crop, additional meetings have been added to the busy winter meeting schedule. Annual meetings with the provincial crop insurance provider also took on a higher priority questioning the effectiveness of the Agri Insurance, Agri Stability and Agri Recovery programs.

As growers prepare for the 2019 crop they are trying to put 2018 behind them although it is a reminder of the risks associated with being a potato producer. In Manitoba, potato producers have spent many hours over the winter months with a sharp pencil to determine how they can take advantage of the opportunity that expansion may be offering them.

spudsmart spudsmart.com/buyersguide

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PRODUCT NEWS

New Two-Volume Collection on Sustainable Potato Cultivation

Two new books on Achieving Sustainable Cultivation of Potatoes have been published by award-winning Cambridge publisher Burleigh Dodds Science Publishing. Volume 1, edited by Dr. Gefu Wang-Pruski, is titled "Breeding Improved Varieties" and Volume 2, edited by Dr. Stuart Wale, is called "Production, Storage and Crop Protection."

"Potatoes can be grown with relatively few inputs in a wide range of environments, making them an important food security crop," says Francis Dodds, editorial director at Burleigh Dodds Science Publishing, who has published the new research.

"However, yields in developing countries are held back by factors such as poor cultivation practices and the impact of pests and diseases, whilst more intensive systems need to become more 'climate smart' to minimize environmental impact and adapt to climate change," he says.

A discount code is available on spudsmart.com for individuals wishing to purchase these books.

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PEOPLE NEWS

Reinke Recognizes Ful-Flo Industries Technician with Plus Program Longevity Award

Reinke has recognized Charles Masters with Ful-Flo Industries in Winnipeg, Man., with a 5-year PLUS Program Longevity Award. Masters received the award in recognition of his dedication to maintaining a PLUS Program certification for five years.

"Committing to the Reinke PLUS Program also shows a commitment to the growers that our dealers serve," said Reinke service training administrator Jennifer Craig. "To maintain this certification for five years is a huge accomplishment. Reinke is proud to honor the dedication shown by these individuals."

The Reinke PLUS (Proven Leaders in Unmatched Service) Program is a service training coursework that's offered to full-service Reinke dealers. The program includes a series of six service training courses and a testing process to qualify as a PLUS or Platinum PLUS certified technician.

To maintain certification, 16 service training credits must be earned each year either through online or in-class training. Certified Reinke PLUS technicians are trained to deliver the most advanced technical service and support to customers.

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Senninger Welcomes New Area Manager for Australasia

Senninger is proud to announce the recent hire of Martin Porter, who joins the International Department as Senninger's new area manager for Australasia. Porter's hiring reinforces the company's appreciation and continued commitment to the territories in Australasia by providing a better support to their growing irrigation market segments.

Porter holds a certificate in Business and Administration from Griffith University in Queensland, Australia. He's been in the irrigation industry for more than 25 years and has great experience in the overhead irrigation market in Australia, New Zealand, and South East Asia.

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BUSINESS NEWS

PAA Annual Meeting to be held in Winnipeg

The 103rd Potato Association of America Annual Meeting is to be held at the Delta Winnipeg Hotel in Winnipeg, Man., from July 28 to Aug. 1, 2019.

Participants will gather to network and exchange the latest research, information and ideas to move potato science forward.

The theme for the symposium is "Changes and Challenges in Potato Marketing Sectors." PAA is a professional organization that represents the scientific arm of the potato industry. The diverse membership of more than 500 individuals and 20 organizations is comprised of private and public potato researchers, university extension and industry personnel and growers.

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World Potato Congress Inc. Launches Webinar Series

The World Potato Congress (WPC) is looking to increase its networking role for the global professional potato value chain, especially during the interval between congresses.

As a result, WPC has set up a webinar series to bring potato professionals together by offering presentations to share inspiring and innovative knowledge or visions. The first live webinar was held on Feb. 25, 2019, and featured WPC president, Romain Cools, who introduced the new communication approach with the webinar titled "World Potato Congress Inc. — Premier Global Networking Organization."

The second webinar was held on Mar. 8, 2019, and featured Dr. Peter Vander-Zaag on the topic "Geographic Constraints in Potato Breeding: Role of Day Length and Light Intensity in Selecting for Adaptation."

Both webinars and future webinars will be available for viewing at www.potatocongress.org until Dec. 31, 2019.

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The Government of Canada Invests to Advance Canadian Horticulture

Lawrence MacAulay, Minister of Veterans Affairs and Associate Minister of National Defence, on behalf of Marie-Claude Bibeau, Minister of Agriculture and Agri-Food, was at the Canadian Horticultural Council Annual General Meeting to announce a federal investment of up to $11.5 million to the Horticulture Cluster under the Canadian Agricultural Partnership. The cluster, led by the Canadian Horticultural Council, will include an additional $6.5 million in contributions from industry, for a total investment of $18 million.

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"Innovation is the lifeblood of Canada's horticulture industry. Through the Canadian Agricultural Partnership, we are committed to supporting cutting-edge research that will address challenges and deliver new tools and practices to help Canadian farmers lead the world in sustainable, high-quality fruit and vegetable production for years to come," said Minister MacAulay.

The cluster will support cutting-edge research to develop new technologies and practices for better pest and disease management, post-harvest storage and handling for apples, berries, field vegetables, potatoes and greenhouse grown crops and strategies to improve soil health.

It will also build on previous work by supporting sustainable practices to reduce the environmental footprint and develop new crop varieties to keep our growers profitable and competitive.

"CHC is thrilled to again be entering into a valued partnership with Agriculture and Agri-Food Canada on its AgriScience Cluster Program. This important funding allows us to broaden the scope of research for many different fruits and vegetables and address key issues, such as pest management tools, labour, production costs, and variety evaluation. AAFC's Cluster program will help to ensure Canadian farmers can continue to grow fruits and vegetables of the highest quality, while supporting the sector's competitiveness in an ever-changing world," said Brian Gilroy, the Canadian Horticultural Council president.

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Minister Bibeau Highlights Government Support for Women in Agriculture

Diversity and inclusion are integral to creating an economy that works for everyone. The full and equal participation of women in Canada's agriculture and food system will ensure the sector remains an engine of economic growth, contributing to the sector's competitiveness and prosperity.

Minister of Agriculture and Agri-Food Marie-Claude Bibeau spoke at the Advancing Women in Agriculture West 2019 conference in Calgary, highlighting the Government of Canada's ongoing commitment to creating a diverse, inclusive economy and supporting women in the agriculture and agri-food sector.

The Minister also announced Farm Credit Canada's new Women Entrepreneur Program to support women entrepreneurs involved in the agriculture and agri-food sector by providing the capital they need to grow their business, along with the meaningful skill development opportunities they are seeking. The program includes access to capital through the Women Entrepreneur Loan, enhanced learning events, partnerships with other groups, and delivery of online content to support their needs.

FCC has committed $500 million over three years for the Women Entrepreneur Loan. As part of the loan, borrowers can have a portion of their fees waived and are encouraged to reinvest these savings into both personal and professional development that best suits their individual and business needs.

"Our government recognizes and supports the important contributions made by women in the continued growth of the agriculture and food sector. By providing women entrepreneurs with the tools and knowledge they need to succeed as leaders in Canadian agriculture, we are supporting a competitive industry that helps

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grow the economy, supports our rural communities and creates good middle class jobs," said Minister Bibeau.

FCC's Women Entrepreneur Program is part of a commitment made under the Government of Canada's Women Entrepreneurship Strategy, a $2-billion investment that seeks to double the number of women-owned and women-led businesses by 2025.

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AHDB Research Focuses on Reducing Potato Sprouting in Stores Without CIPC

Currently CIPC is used as a sprout suppressant on more than 80 per cent of potatoes stored in the UK. However, the future of CIPC remains uncertain as the European Food Safety Agency's recommendation is for non-renewal, which could leave many growers lacking options in terms of short and long term potato storage.

While CIPC remains the most effective method for reducing sprouting in storage, AHDB has been carrying out trials on alternative suppressants and early results have shown that some of these options work well, particularly when combined. This latest research builds on previous work on sprout suppression which has been recognised as a major issue due to the industry's reliance on CIPC.

"It looks likely that in the future growers won't be able to rely on one active product, but instead may need to combine two or three chemicals, such as maleic hydrazide and DMN, to get the same result. For example, in the first year of trials, combinations of active substances were needed to control sprouting in the most demanding conditions, without CIPC," said AHDB crop storage senior scientist, Adrian Briddon. *Source: AHDB*

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Transgene-Free Genome Editing in Tomato and Potato Plants

Plant scientists are now using genome editing tools to explore on gene function and develop crops for improvement of traits. One of the technical challenges in using such tools is to efficiently induce precise and predictable targeted point mutations for crop breeding. Thus, new additional tools have been developed such as cytidine base editors (CBEs), which are CRISPR-Cas9 derived tools used to direct cytidine to thymine base conversion.

In dicots, the most stable genomic integration of CRISPR-Cas9 is through *Agrobacterium*-mediated transformation. However, elimination of the foreign DNA may be hard to accomplish, particularly in vegetatively propagated plants.

Florian Veillet from Institut National de la Recherche Agronomique in France, together with other researchers targeted the *acetolactate synthase* gene in tomato and potato by a CBE using *Agrobacterium*-mediated transformation. They successfully edited the targeted cytidine bases, which led to chlorsulfuron-resistant plants with precise base edition efficiency of up to 71% in tomato.

They also produced 12.9% and 10% edited (transgene-free) tomato and potato plants, respectively. This approach decreases the unwanted effects that may be caused by random integration of transgenes into the host genome.

The new approach used in the study is expected to introduce new perspectives for genome engineering by co-edition of the ALS with other genes, leading to transgene-free plants with new traits. *Source: ISAAA* and *International Journal of Molecular Sciences*

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Improving the Nutritional Value of Potatoes is a UN Objective

As potatoes are a major food crop, improving their nutritional value will contribute to the UN 2030 Agenda for Sustainable Development, provided that production is also increased.

The realistic targets for genetic improvement are:

- ensuring tuber steroidal glycoalkaloids do not exceed 20 mg/100 g of fresh weight;
- reducing acrylamide formation in chips and French fries below benchmark levels of 750 and 500 µg/kg, respectively;
- reducing glycaemic index by increasing the amount of resistant starch;
- increasing protein quantity and quality and the concentration of iron and zinc and of vitamins B9 and C. ○

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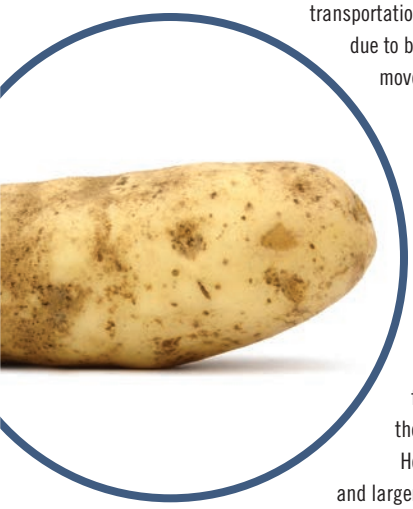
UNITED STATES

Idaho Russet potatoes are going to be short until the new crop comes in late summer. "Part of this is because there's really good demand from the dehydration and frozen sector and they're dipping into potatoes that normally go into the fresh market," says Kent Sutton at Rexburg, Idaho-based Bench Mark Potato Co. Inc.

And while last fall Idaho fared with a relatively normal crop, Sutton notes that approximately 10,000 acres of potatoes suffered frost damage and weren't suitable for the fresh market. "They wouldn't store so they're pushed into the dehydration market and that effectively removed an awful lot of potatoes that would normally be in the fresh market channel," he says.

At the same time, demand for potatoes has stayed steady. "The only time demand softened is when the East and Midwest experienced brutal winter conditions and people just didn't go out," he says. "We also had a few transportation issues where the interstates were closed due to bad weather. Overall we've just lost a bit of movement due to inclement weather."



Yet, pricing is good and similar to last year's numbers. "They are at the level where the growers are making money and the prices seem strong and I'm sure they'll continue to strengthen," Sutton says. "The Burbank crop size is a little limited due to the smoke we had late in the growing season (from the summer 2018 wildfires). So, the Norkotas over the next few weeks will phase out of the market and then it will only be Burbanks available."

He also notes that availability on sizes 10 oz. and larger is going to be very limited and will likely push up in price. "The market on large sizes will continue to strengthen a little bit. There'll be less and less Norkotas available. I see the biggest price gains in 40-50-60-70 larger sizes."

And with an eye on the 2019 crop later this year, Sutton is watching the potential impact the current weather is having on fall crops.

"A lot of years the new crop potatoes are already planted in Washington and, in some cases, in Western Idaho. But not this year. They're definitely behind," he says, noting that while his region doesn't plant this early, they do watch other producing regions to determine if Idaho needs to come in with an early crop or sell off its older ones sooner. "It looks like they're going to at least start off the season well behind normal," he says. "A lot of that will have to do with what the weather is like in May, June, July. If there are good growing conditions, those late-planted potatoes will catch up. If it's not and they have cool weather continuing throughout the early part of summer, it'll definitely delay the new potatoes." SOURCE: FRESHPLAZA

UNITED KINGDOM

Researchers at the James Hutton Institute and partner organizations are working to understand the mechanisms behind senescent sweetening, a problem responsible for considerable losses of potato crops during storage, particularly in the processing market.

Speaking at the Scottish Society for Crop Research (SSCR) Potato Winter Meeting 2019, Dr. Rob Hancock, based within the Institute's Cell and Molecular Sciences group, said: "This AHDB-funded project aims to define the biochemical pathways associated with senescent sweetening.

"We'll do this by identifying key genes influencing the accumulation of sugars and testing the hypothesis that the issue is linked to tuber ageing and senescence.

"By the end of the project, we aim to provide predictive markers of sweetening onset, and identify candidate genes and markers to accelerate the development of sweetening-resistant varieties."

Sugar accumulation in stored potato tubers is a problem for the processing industry due to the development of a dark fry colour which is negatively perceived by consumers. Sugars also react with the amino acid asparagine during high-temperature processing (frying, roasting) leading to the formation of the neurotoxin and potential carcinogen acrylamide.

While there is no evidence to suggest that the low levels formed in processed potato products are harmful to health, the industry adopts the precautionary principle and aims to minimise exposure wherever possible.

SOURCE: THE JAMES HUTTON INSTITUTE

EGYPT

The International Food and Consumable Goods Company (IFCG) is planning to establish a new factory for the production of frozen vegetables after the increased demand, with investments worth EGP 350m [C$26.9 million]. Construction operations are likely to start next year.

Mohamed Habib, the company's export manager, said that the trend towards frozen vegetables production came after the demand for the company's products increased this year, in parallel with the rise in the global demand for processed potatoes in view of the decline in Europe's production of potatoes by 25%.

Habib explained that the company has successfully concluded contracts to supply its products to McCain in order to meet the needs of the company's clients in Latin America, in addition to contracting with Eipico on the production of processed potatoes.

He pointed out that the company aims to increase its production volume of potatoes and sweet potatoes this year to 55,000 tonnes, compared to 32,000 tonnes last year, in addition expanding its presence in its share in the local market, in conjunction with the pressure for more demand on the European market products.

"The company will determine its plan to expand during the fourth quarter of this year in order to understand the volume of export demands, including various products, such as processed potatoes, sweet potatoes, and frozen vegetables," Habib said.

Furthermore, he indicated that the company relies on obtaining 70% of its potato needs from its own farms on 1,100 feddan, while contracts were signed with farmers to provide the rest of the needs, in addition to the company's trend to store quantities of the crops produced in order to meet export needs the whole year.

SOURCE: DAILY NEWS EGYPT

Champion Potato Grower has Roots in Holland

ALBERTA POTATO PRODUCER Laus Stiekema was in his early 40s when he decided to leave the Netherlands with his wife and four kids to start a new life on the Canadian prairies in 2004.

Fifteen years later, there's no question that Stiekema and his family have landed on their feet.

Stiekema now runs a thriving potato operation called Stiekema-Kolhorn Joint Venture in Vauxhall, Alta. Last November, Stiekema-Kolhorn JV was named McCain Food's 2018 Crop Year Champion Potato Grower for the company's processing plant in Coaldale, Alta.

"We've been in the top 10 a few times, but never number one," says Stiekema. "We were very pleased."

Stiekema says receiving the McCain Champion Potato Grower award was definitely a team effort.

"That trophy goes into the coffee room," he says. "All of our guys who work here, we congratulate them, too, because it's their effort as well. We're a pretty flat level organization and everybody does their part."

Stiekema, who's 58, comes from a long line of potato growers. He, his father and his granddad all grew potatoes and other vegetables in Holland.

"I come from a family that grew potatoes for a long, long time, just on a small scale," he says. "Our family farm in the Netherlands was really small. We figured there was more space and more opportunity [in Canada] and that's why we moved here."

The family tradition continues today, as Stiekema's wife, Willy, their son Lauran, and their daughter, Pauline, and her husband, Jaco, all help run the farm. Stiekema and his wife have two other children who are not involved in the farm.

Stiekema acknowledges it was a hard thing to leave his family and friends in the Netherlands behind.

"You can't deny if you've lived in the country for 40 years that you have roots there, so you have to find your new social network again. That's an investment, but it's also good and it's an adventure, too, and that's positive thing," he says.

"People were very welcoming in Canada," Stiekema adds. "It's been really good that way."

Stiekema says potato farming in Alberta is very different than it is in Holland due to different climates and other factors. Not long after arriving in Canada, he realized his best chance of success was to try to follow his neighbours.

Stiekema-Kolhorn JV in Vauxhall, Alta. From left to right: Lauran Stiekema, Laus Stiekema and Jaco Kolhorn.

"Basically, just looking across the fence line and seeing how they prepared the land and how they raised their crops, and over time we started to incorporate our own experiences and knowledge from across the pond. That way you get the best of both worlds," Stiekema says.

Today, Stiekema grows 800 acres of potatoes on his 3,600-acre farm, producing Russet Burbank, Russet Ranger and Ivory Russet processing potatoes for Lamb Weston and Cavendish Farms as well as McCain Foods.

"We usually grow grain on about 50 per cent of our acres. By trading land with our neighbours, we're able to rotate our potatoes every six to eight years," says Stiekema, adding that the farm's other rotation crops include wheat, seed canola, seed alfalfa, sugar beets, corn and dry beans.

"We try to do a wide rotation in order to get the healthiest soil we possibly can," says Stiekema. "We believe healthy soils yield healthy crops, and because margins are getting slimmer, you can't get by with deteriorating yields. You need to have a good crop."

Stiekema, who's a past chairman of the Potato Growers of Alberta, is optimistic about the future of potatoes.

"Potatoes are a very healthy food, much healthier than people used to think. I think the world is starting to see that," he says. "It's a growing market, especially in developing countries, so I believe there will be a big need for potato products going forward." ○ MARK HALSALL

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