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On the cover: Bradley Hogg of Prince Edward Island's Klondike Farms Ltd. and neighbour Lee Winchester survey potatoes in storage.

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CIP Powers Progress

By Julieanne Isaacs and Hubert Zandstra



Hubert Zandstra is the former director of CIP and an advisor on sustainable food security. The Hubert Zandstra Biodiversity Complex in Lima, Peru, is named after him.

EACH YEAR at planting time, the high slopes and valleys of the Andes are dotted with community work crews planting their unique collections of five to 15 native potato varieties, after they have asked the “Pachamama” or “Mother Earth” for blessings with colourful songs, dances, and food and drinks for the occasion. Throughout the Andean region and for hundreds of years, this wealth from hundreds of communities nurtures the genetic diversity of the potato, to the benefit of the whole world.

Last year marked the fortieth anniversary of the International Potato Center (CIP) in Lima, Peru. According to its website, CIP’s mission is to “work with partners to achieve food security, well-being and gender equity for poor people in root and tuber farming and food systems in the developing world. We do this through research and innovation in science, technology and capacity strengthening.” The work of CIP, led by director general Pamela Anderson, is unique in a global research system that occasionally seems geared toward improving the profitability of the rich. More than that, CIP’s conservation work contains an important message for the global potato industry: what we do today as growers, and how we do it, matters for the generations to come.

Janny van Beem, who works in the acquisition and distribution of genetic resources for the center in Lima, argues for the global importance of CIP’s work. “CIP has done significant research which has generated clones with resistance to viruses and fungi and tolerance to drought and frost,” she says. “These clones, in turn, have been used extensively by many breeding programs around the world.”

Much of CIP’s work is geared toward the protection of its genebank collections, which is important for the potato industry today and into the future. “Genebanks ensure the continued survival of cultivars, landraces and wild species that may have become extinct due to urban development or climate change,” says van Beem. “Many accessions have been evaluated in genebanks and brought to breeding programs in more than 100 countries in response to newly-emerging pathogens. It is therefore important to conserve what we collected decades ago, but also to continue to collect new accessions that may contain interesting genetic combinations.” CIP researchers are also actively engaged in protecting the rights of farmers around the world and honouring their local traditions—another aspect of conservation that both strengthens international collaborations and supports individual communities.

With its growing store of genetic information, now including some 7,000 native and wild potato accessions, researchers are equipped to tackle problems potato growers are facing around the world on a daily basis. This work of problem solving and conservation leads, in turn, to stronger markets abroad, and healthy competition internationally—which is good for everyone.

Storing and marketing this year’s potatoes and laying the foundations for next season might be the focus of most growers in Canada, but it’s good to remember that international research efforts are always boiling in the background, fuelling progress for the future.

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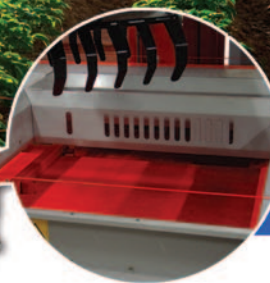
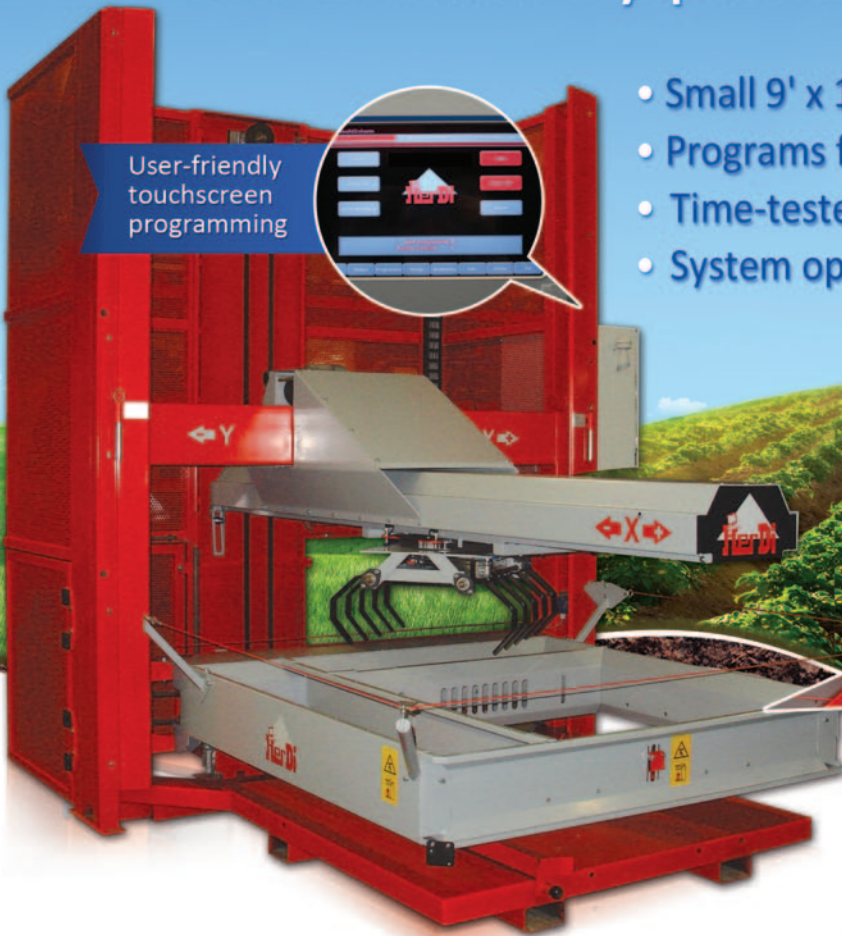
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Angela Scott, lab technician at Techmark Inc., grading potato chips.

Photos courtesy of Techmark Inc.

QUALITY CONTROL

Whether they're Russet Burbanks or Ivory Crisps, this year's storage potatoes might have quality issues that require a unique brand of management.

THE UNUSUALLY hot and dry conditions that prevailed throughout many areas this season are presenting some unique challenges for potato storage, as many growers are uncertain how different varieties will perform in storage this year.

"There's more uncertainty this year because we haven't experienced a year like this," says Todd Forbush, an engineer with Techmark Inc. "When you are facing uncertainty a definition of your position is very valuable."

Techmark conducted a survey of actual weather data in potato production regions in North America and found that the 2012 growing season, in general, had periods of extreme heat and drought from March through July and milder temperatures in August and September, although there were local variations.

What's vitally important is that growers know what has happened in their own crop throughout the season and understand what they may be dealing with in terms of storage considerations. "The most important factor for growers is to access their local weather, in some instances field by field, and determine how to respond to the benefits received and challenges presented by that local weather," says Forbush.

It's already known that this year's harvested potatoes will have lower specific gravity, which means a greater volume of potatoes will be needed for the solids required for processing into fries or potato chips. "If you have three per cent lower specific

“It’s going to be an interesting year to store potatoes.”

George Burkholder

gravity than normal you are going to need three per cent more tonnes of potatoes to process,” says Forbush.

However, because of higher production this year in general, due to increased acres and moderate, average or good yields in most areas, that shouldn’t present too much of a problem, as long as the crops store well.

Heat Stress

Potatoes can age faster and be subject to various problems affecting their quality and dormancy when subjected to prolonged periods of heat stress. Potato dormancy is affected by the number of heat units received. Extremely hot weather through the growing season adds more heat units to the tuber and that shortens a potato’s dormancy for storage. Some potatoes have even been sprouting in the fields.

“A rule of thumb is that from tuber initiation, which would probably be in late June, physiological age is measured as the temperature degree days above 4 C,” says Peter VanderZaag of Sunrise Potato Storage in Ontario. “For example, if the soil temperature at the top of the hill reaches 26 C on a certain day, those tubers will have aged 26 C minus 4 C, which is the equivalent of 22 degree days of aging. The soil temperature at the top of the hill is hotter than at the bottom of the hill, so if the tubers at the bottom of the hill are at 18 C, they will have aged 18 C minus 4 C, which is the equivalent to only 14 degree days of aging,” VanderZaag explains.

“If you start measuring degree days in that way, the physiological aging process is already well-advanced this year in the early planted material, because of the intensity and duration of the hot, dry conditions this summer, particularly for those tubers that grew near the top of the hill,” VanderZaag continues. “This has led to a highly variable aging process as the tubers from all parts of the hill are mixed together in storage. This will have major implications for how long we can store processing potatoes this year.”

VanderZaag anticipates that he will have to maintain high humidity levels and bring the storage temperature for his earlier harvested chipping potatoes a couple of degrees lower than normal—down to 8 C—to maintain the colour for frying and hopefully avoid losing a couple of months of storage time.

Potatoes that were planted later in the season may have avoided some of the prolonged heat. VanderZaag is glad that delayed planting of his longer storing varieties like Marcy and Lamoaka until late May and early June may have earned him some

extra storage life. “They probably tuberized around mid-July, so I think there will be less impact from heat stress,” he says.

Dormancy

The timing of when potatoes break dormancy varies depending on the variety. Varieties that store best are ones with longer natural dormancy, such as Russet Burbank. Others, like chipping variety Dakota Pearl, could store less well because of its short natural dormancy, which is probably already shortened due to the hot summer.

Dormancy is also controlled by temperature while in the storage. “The warmer potatoes are stored, the shorter the dormancy period will be,” says George Burkholder, owner of GRB Ag Technologies, a consulting company based in Mitchell, Ont. “If you can keep them cool, they will store longer before they want to sprout. But if they are stored too cold they will develop higher sugar levels and will be off-colour, which is undesirable for chipping potatoes, so you have to determine the lower limit of your temperature by monitoring the sugars carefully and frequently.

Processing potatoes are usually stored at temperatures around 6 C to 9 C and will maintain dormancy at those temperatures for a certain period of time depending on the variety. Russet Burbank, for example, will maintain dormancy on average for 175 days at 6 C and for 130 days at 9 C.

Once there is a risk of potatoes breaking dormancy, sprout inhibitors are often used to attempt to extend dormancy. “If a grower has a crop that is beyond peak maturity or over-mature, [the potatoes] will tend to break dormancy quicker than that variety will in a less stressful year,” says Forbush. “This means that growers need to be aware of and on top of their sprout control programs.”

Sugar Ends

Sugar ends can be another problem associated with stress caused by early-season drought, and under these circumstances, dryland producers may be especially at risk. Sugar ends are caused by excessive glucose in the stem end of the potato and can represent a problem for either chip or french fry processors, because affected potatoes become undesirably dark on one end. Some varieties, such as Russet Burbank, are especially susceptible to sugar ends. But sugar ends can also be caused by disease in the plant that inhibits the transfer and storage of sucrose produced in the plant to the tuber. So it’s important to first identify whether sugar ends are being caused by disease or are weather-related, and sample to determine how prevalent the problem is in the crop.



Patrick Morris, lab manager at Techmark Inc., preparing potato juice for sucrose and glucose analysis.

Disease or early season-related sugar ends may leave producers with no option but to sell the crop as early as they can. Later-season weather-related sugar ends can sometimes be alleviated by pre-conditioning the crop at slightly higher temperatures than normal, around 16 C.

Sugar sampling is a good way to monitor crops for sugar ends and other problems. "I think the best option is to properly identify or fingerprint each field or bin of potatoes," says Forbush. "There is a blend of variety, field choice, agronomy, disease pressure and weather that make up each lot of potatoes for a given growing season. These individual lots need to have their strengths and weakness identified and they should be marketed accordingly. Pre- and post-harvest potato sugar sampling is one tool that we use to fingerprint each lot of potatoes that we work with."


The quality of ventilation systems has improved immensely over the past 10 years and, in the hands of savvy storage operators, says Burkholder, these systems can be a huge asset to extend the storability of potatoes, especially in a year when most potatoes were under extreme stress during the growing season.

Variety choice is likely to become a top consideration as weather-related stresses are affecting more growers across the globe. Seasons like 2012 may help growers sort out which varieties are going to be the best choices under difficult conditions. "The grower's choice to plant a potato variety that can withstand the stress associated with adverse weather is important," says Forbush. "As stress-averse varieties are identified during growing seasons like the 2012 season, the choices can be made to adapt these into the variety mix a grower uses on his or her operation."

As potatoes go into bins across North America, many growers and storage managers are still not entirely sure what to expect as they approach winter. "It's going to be an interesting year to store potatoes," says Burkholder. **Angela Lovell**

Want More?

The University of Idaho offers information on the specific storage characteristics of different potato varieties:
www.kimberly.uidaho.edu/potatoes/INFO.htm#VARIETY_STORAGE_MANAGEMENT



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TuberLog is designed to mimic the size, shape and density of a potato, to locate impacts that are likely sources of damage as it passes through machinery along with real potatoes.

New Tools for Bruise-Free Storage

Three new products offer anti-bruising help for next year's harvest.

THIS SEASON, GROWERS are steeling themselves for challenging storage conditions, following wet weather in many areas of Canada. But even if weather can't be controlled, to some extent, bruising can—which could mean an improved crop heading into storage.

Smart Spud

Moncton-based Masitek Instruments Inc. is a private technology company offering customized and replicated devices to help identify root cause failures related to shocks in bottling, cracks in eggs and bruising in produce.

The company recently launched its next generation Smart Spud real-time wireless detection system for the potato industry. "This product measures impact and vibration so our customers can instantly and accurately detect where bruising and potato damage is occurring in post-harvest processes," explains Tracy Clinch, president of Masitek.

The new generation Smart Spud features easy-to-use technology, according to Dave McNally, Masitek's director of sales and marketing, which focuses on helping customers eliminate waste by reducing the two most common types of potato damage: black spot and shatter bruising.

Smart Spud wireless sensors are enclosed in replicated casings that can be placed alongside potatoes in harvesting, grading and packaging environments. "They go through the same conditions and react like real potatoes, sending constant data to on-site mobile tablets," Clinch says. "Customers know immediately where bruising is occurring, and can make changes and validate the success of those adjustments within minutes." That important data is also backed up on a computer server for later analysis and reporting purposes.

Masitek has added on-board memory to the circuit of the new generation Smart Spud devices. "This makes it possible for data to be backed up directly to the sensor, delivering a complete line profile even if the signal fades in an enclosed area," says McNally. "Combined with the new Windows-based platform, this makes the new Smart Spud technology an industry leader in bruise prevention."

According to the company, clients who have used the previous version have reported increased bruise-free rates of up to 10 per cent and overall cost savings that continue to make a positive impact on their bottom lines. "This updated and improved version will deliver even better and faster results," says McNally.

TuberLog

At Potato Europe 2012 in September, United Kingdom-based Martin Lishman Ltd. re-introduced an electronic potato device designed to capture real impact forces on potatoes to their range of potato quality control equipment.

The product is sold in two variations, TuberLog and TuberLogPlus, which were devised and produced

by a team of researchers from Potsdam University in Germany, together with electronics specialists from the development company ESYS and a panel of potato industry experts. According to the company, the new devices take previous electronic potato designs several steps further by incorporating Bluetooth and the latest Android technologies.

"Potato bruising is a serious problem in potato production worldwide, with estimates that more than 60 per cent of some crops are damaged in some way," says Gavin Lishman, managing director of Martin Lishman. "At a time of low potato prices, the economic effects of such losses cannot be overestimated, so the arrival of the TuberLog is very timely. Preventive action by growers and processors looking to reduce their losses will be more justifiable and more likely to take place."

Packhouses, processors, cooperatives and growers can all benefit from the quality control information that TuberLog provides. Built-in shock sensors measure and locate impacts

Photo courtesy of Martin Lishman Ltd.



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that are likely sources of potato damage as the TuberLog passes through machinery along with real potatoes.

The TuberLog device comprises a data logger embedded in a synthetic shape designed to mimic the size, shape and density of a potato. The TuberLog data logger records impacts and temperature values during each measurement. The data can be stored in the logger itself or transferred by USB connection or Bluetooth to a PC or laptop where it can be stored and analyzed using the software supplied.

TuberLog data can be displayed as a table or graph of impacts as the device passes through the machine or as a percentage distribution of impacts of different levels. TuberLogPlus registers impacts instantly and the information is delivered both audibly, to the operator's headphones, and visually, on the screen of an Android tablet. The operator watches the TuberLogPlus as it passes through the machine and can immediately see the exact source of the impact.

Impact measurements from the devices can be compared with bruise test results from real potatoes taken from the same machine section. This type of comparison, conducted in several situations, allows for the swift interpretation of results. As an example, it may be known that a variety starts bruising at the 150 grams impact level, but TuberLog records impacts of 50g, so that particular variety can safely be processed by a machine with sources of impacts that are too low to cause damage.

Potato "Hot Box"

Similarly, Martin Lishman's SMQC Potato Hot Box is an on-farm bruise testing device that assists with crop assessment on-farm before the potatoes go into storage or are processed.

When potatoes are bruised, the physical effects are not immediately visible. A biochemical reaction takes place which gradually causes a colour change at the point of impact. In cool, dry conditions this effect can take several days to appear. Blackspot is the consequence of the susceptibility of potatoes to bruising caused by high impact levels during handling. It consists of dark-coloured spots below the skin surface which become visible after peeling.

The Potato Hot Box speeds up the reaction time of potato tubers to show physical effects of bruising by creating the optimal warm, damp conditions in which bruise development occurs. Typically, a temperature setting of 30 C for a time period of 12 hours is sufficient to bring out any bruising.

Samples are peel-tested for bruises as soon as they are removed from the hot box. The degree of blackspot severity is assessed from the number of times the potato must be peeled before the spot disappears.

The design of the hot box also allows levels of tuber blight and soft rot to be assessed. Lower temperatures and longer testing times can be selected, suitable for accelerating the incubation of diseases.

Using tools like these, commercial growers could find that their potatoes have fewer bruises—limiting damage as crops head into storage. **Lukie Pieterse**

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The Frozen Truth

As new markets open overseas and demand increases, frozen potatoes are increasingly crucial to the Canadian potato industry.

WHEN ASKED WHAT comes to mind when they think of potatoes, most Canadians would likely describe heaps of fresh spuds in the produce aisle, Russets destined to be mashed during holidays, or new potatoes rolling onto the countertop after a trip to the local farmers' market.

In reality, most potatoes grown in Canada are frozen, processed and turned into french fries and other frozen potato products, bound for locations as close to home as the U.S. Pacific Northwest, or as far as Venezuela, China or India. The significance of the frozen potato export market has not been fully explored in the media—but it should be, because it forms the backbone of the Canadian potato industry.

According to Patrick Girard, senior media relations officer for Agriculture and Agri-Food Canada, a whopping 91 per cent of potatoes exported for the processing market are headed directly for the frozen potato market. In 2010/2011, frozen processed product exports accounted for \$800,384,852 of the \$1,101,859,560 generated by potato exports. "In 2011, Canada was the fourth-largest exporter of frozen potatoes, after the Netherlands, Belgium and the United States," says Girard.

If you examine the numbers closely, they'll tell you that exports decreased slightly in the last few years, according to Kevin MacIsaac, general manager of the United Potato Growers of Canada, but this is not a straightforward indicator of profitability. "In 2007/2008, the numbers would say that Canada exported 979 million kilograms [of frozen potatoes], and that's declined every year to 2011 where we exported 876 million kilograms. If you look at the value, what it was worth was not a straight decline, because

in at least one of those years there was a significant increase in value,” he explains.

Over the longer-term, the numbers look positive. Domestically, demand for frozen potato products has remained stable, says Girard. And further afield, demand is increasing. “Over the last 10 years, there have been ups and downs in exports of Canadian frozen potatoes but overall, the total value of exports has increased slightly,” he says.

The vast majority of frozen spuds are grown on contract for McCain Foods, with the remainder moving through, in order by volume, Cavendish on the East Coast, Simplot and Lamb Weston.

Close Ties

Where are these frozen potatoes headed? “The United States really takes the lion’s share of what we export,” explains MacIsaac. “After that in the ranking order would be Japan, Mexico, Venezuela and the Philippines.”

Bruce Huffaker, Idaho-based market analyst and president of North American Potato Market News, Inc., emphasizes the close ties between the U.S. and Canadian potato markets. “Canada’s major market for frozen fries has been and will be the United States.

“Even today, U.S. exports are almost 90 per cent replaced by products coming out of Canada. As U.S. exports grow to offshore locations that opens up more of a market for Canada.”

Bruce Huffaker

That’s the way the industry is set up,” he says. Processing giants such as McCain fulfill U.S. export contracts using both Canadian and U.S. potatoes, and vast orders of Canadian potatoes are shipped to the United States to be used as backfill in their exports abroad.

“Most of the production in the U.S. is in the Pacific Northwest, so what you see is that the Canadian market backfills the U.S. supplies,” says Huffaker. “Even today, U.S. exports are probably 90 per cent replaced by products coming out of Canada. As U.S. exports grow to offshore locations that opens up more of a market for Canada.”

Giants like McCain, he says, “have been emphasizing the superior quality of french fry products produced in North America, and they don’t distinguish between U.S. and Canada. They’ve been able to sign multi-year contracts by doing that. The original

Frozen Varieties

Variety marketing is a burgeoning concept in the North American potato market, but it has plenty of room to grow. According to Kevin MacIsaac, general manager of the United Potato Growers of Canada, the main varieties grown for frozen processing are Russet Burbank, Ranger Russet, Innovator and Shepody—but for agronomic reasons these are not necessarily the best varieties to grow for frozen processing. “We’re still using old, old varieties,” says MacIsaac. “The number one variety among processors is Russet Burbank, an ancient variety [with] lots of issues. Shepody is a newer variety, but it has a lot of agronomic [issues] that tend to not make it a great variety in terms of yield and dockage.”

However, growers can’t simply decide to try out new varieties for their customers—they grow specific varieties under contract, based on required qualities such as good fry colour and high specific gravity. If growers want to try out varieties that are easier to grow and still offer these premium qualities, says MacIsaac, those varieties must first be recognized by quick service restaurants. “If you think you have the best variety in the world, if it’s not recognized by McDonald’s and Wendy’s, it has no value because they won’t buy varieties they’re not sure about.”

Variety marketing needs to happen on multiple levels—at the level of the consumer and the customer—before newer, stronger varieties can be used to fulfill contracts, and save growers headaches. “Luther Burbank developed the Russet Burbank variety in 1871 as an improvement over the common Irish potato,” says MacIsaac.

“Amazingly enough, in 2012 we are still waiting for new and more improved varieties to surpass it.”

contracts were signed when European supply was tight," he says. "It seems to be working—we've seen a lot of growth over the last few years."

"If you think you have the best variety in the world, if it's not recognized by McDonald's, Burger King and Wendy's, it has no value because they won't buy varieties they're not sure about."

Kevin MacIsaac

This arrangement is good for growers north of the border. As long as U.S. international markets continue to widen, business will be booming for Canadian processing growers.

But how does marketing play into this arrangement? Simply put, by expanding foreign markets, claim analysts. As long as processing giants continue to market potatoes as "North American" rather than distinguishing between U.S. and Canadian potatoes, foreign marketing initiatives will support growers on both sides of the border.

MacIsaac believes there are two reasons for increasing demand for North American potatoes abroad. First, as affluence increases in developing countries, a demand for Western-style foods also increases. Second, processing companies are engaged in aggressive grassroots-level marketing campaigns abroad that are generating results. "It's difficult to start marketing into some of these countries unless you are informed about their cultures, and how they view menus and nutrition and so on, and these companies have worked hard and are starting to see some success," says MacIsaac.

The Future of Frozen

How the markets will look in five or 10 years is difficult to predict, as markets continually fluctuate and developing countries ramp up production.

For Canada, a crucial influence on the success of the potato industry will be the value of the Canadian dollar versus the U.S. dollar. "The question is, is the Canadian dollar overvalued now, or undervalued? Can Canadian growers hold their prices for the raw product with that high dollar value? That will be another issue for Canadian growers," says Huffaker. "Right now [Canadian growers] are probably getting more money for their potatoes under contract than what their counterparts in the U.S. are receiving."

Historically speaking, processing companies such as McCain have increased or decreased production north or south of the border based on the value of the dollar. "If the Canadian dollar loses value to the U.S. dollar, there'd be a renewed emphasis on Canadian production," says Huffaker.

"In the future the picture will probably be different, but how and when it changes is anybody's guess." **Julienne Isaacs**

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Navigating the Trade Landscape

As new trade links become accessible, more potatoes are being shipped each year around the globe. Where does Canada fit in the landscape of international trade?



USPB and USDA personnel standing with award-winning chefs at their annual contest in China.

Photo courtesy of the United States Potato Board.

ALONG WITH RICE, corn and wheat, potatoes are counted among the top four food crops worldwide. The fact that the potato is the only horticultural crop to make this list is pretty impressive for this so-called “humble” vegetable.

As the potato increases in significance globally, the trade landscape for the crop is changing. Over the past several years, production has shot up in China, India, eastern Europe and other

According to John Toaspern, vice-president of international marketing for the United States Potato Board, none of these figures should come as a surprise to the industry. “It’s not that big of a switch—it’s more of a switch in people’s minds rather than in reality, because potatoes have been a staple in China, India and Latin America for years,” he says. “From our perspective, we haven’t really seen a significant change in the trade landscape, because while there is increasing production in China and elsewhere, it is still less than increasing demand, so the need for potatoes from the U.S. and from Canada has not diminished due to increasing production elsewhere.”

But the growing demand for spuds in developing nations, such as the BRIC countries—Brazil, Russia, India and China—which are said to be at similar stages of development, bears watching.

“Countries to watch would certainly have to be China and India because they have been expanding potato production rapidly,” says Allan Parker, president of the World Potato Congress. “I would also include Brazil as another BRIC country to watch. There is also a definite shift in some former Eastern bloc countries to a more professionally-oriented potato industry to replace home gardens as the main supplier of potatoes for the population. This shift should make those countries more competitive, at least for import substitution.”

Toaspern argues that the driving forces behind the increasing demand for potatoes and potato products in the developing world include the “globalization of the dining experience” and the high profile of Western food in developing countries, where more people are shifting into middle-class categories every year.

“Canada will continue to supply high-quality fresh and processed potatoes to established markets and to compete for more market share.”

Allan Parker

areas. According to 2010 statistics from the United Nation’s Food and Agriculture Organization, China’s production increased to a record 74.8 million metric tonnes, while India’s increased to 36.6 MMT, followed by the Russian Federation at 21.1 MMT and Ukraine at 18.7 MMT. Fifth on the list was the United States at 18.0 MMT, a drop from its levels in 2008 and 2009. Canada weighed in at 4.4 MMT, and fifteenth on the list overall.



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Creative Marketing

The USPB has played a significant role in cultivating the reputation of the U.S. potato in developing nations—and the crop in general. “We work a lot on increasing demand in these countries, helping to open up new channels, places where potato products might not have been used before, [and] introducing potatoes to the local cuisine,” says Toaspern.

These efforts are geared toward both straight-up marketing and a “grassroots” style of marketing in which care is taken to understand the culinary traditions of the targeted demographic. “In China, we’ve done a whole program focused on Chinese restaurants,” says Toaspern. “We put together a DVD that shows how to cook frozen potato products in a wok and then gives a lot of ideas of local Chinese dishes that could be modified to include U.S. frozen potato products.”

These campaigns are long-running and carefully considered to suit local tastes for more than just spuds. “We do a chef contest once a year where chefs come from across the country to Shanghai and compete using U.S. frozen potatoes in a local dish,” Toaspern says. These dishes often make it to the menus of the winning chefs’ restaurants—which are frequently chains.

The USPB works with representatives on the ground and food technologists to create new product ideas for each market. While this often involves frozen potatoes, it also encompasses dehydrated potatoes in new applications, says Toaspern. “We’ve done a lot of work on incorporating dehydrated potatoes into bakery goods. This has been done in Korea, Mexico, all sorts of places where new products have been launched using U.S. potatoes.”

Forging a Path

Canada has its own path to forge in the coming years. According to Parker, Brand Canada is no small potato on the global trade scene, and the future is bright. “Canada will continue to supply high-quality fresh and processed potatoes to established markets, and to compete for more market share,” he says. “Quality will be key, as will competitive prices and client service of exceptional quality.”

As international demand for potatoes increases, Parker predicts a continued focus on processed spuds. “Consumption in mature markets and mature economies will continue a shift to processed and convenience potato products, but I look for a large part of the market in developing and transitional economies to still rely on fresh potatoes as a mainstay for usage,” he says.

Overall, Parker is optimistic about increased industry communications and globalization of trade. He says that the World Potato Congress is testament to the fact that increased communication fosters positive trade relationships. “Events like the World Potato Congresses are vital to the exchange of information, as are social media, the Internet, and of course print media,” says Parker. “Trade in all its forms relies on interpersonal links, and I have seen nothing which persuades me there is finally a substitute to meeting face to face with buyers and suppliers to get the trades made.” **Julienne Isaacs**

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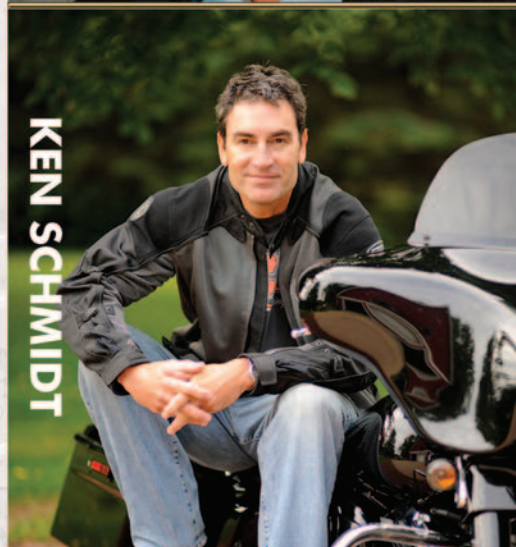


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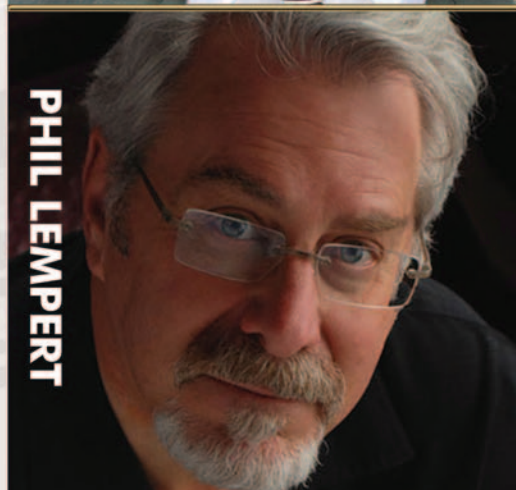
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eye on the nation

BRITISH COLUMBIA

**Tom Demma, General Manager
B.C. Vegetable Marketing Commission**



British Columbia's total planted area for 2012 is 6,700 acres with 5,600 and 1,100 acres for fresh marketing and seed potato end use, respectively. These values are not much different when compared to 2011.

The weather experienced in B.C. during the potato season, from seeding to harvest, held many extreme events for the Fraser Valley and Vancouver Island growing areas, and this influenced the outcome of both the B.C. tablestock and seed potato crops. In the spring there was an extended period of cool, wet weather that made seeding challenging both in terms of its completion and germination. With the return of warmer weather, the potato main crop moved ahead to where crop maturity came on pace with customary crop development patterns.

The early nugget crop was seeded at the customary time; however, conditions for doing so were less than ideal. The return of warmer weather in mid-June resulted in a good nugget potato crop in terms of volume and quality. Marketing of white nugget potatoes was completed by mid-July, followed by the marketing of other white potato varieties typically not sold as nuggets.

The Fraser Valley and Vancouver Island growing areas experienced a prolonged dry spell, accompanied by periodically higher than normal daytime temperatures, beginning in mid-July and extending into late September. As a result, the main crop reached maturity and harvesting commenced earlier than normal.

Overall, the 2012 B.C. potato crop is rated average volume-wise without much year-over-year variation in yields for the customary range of potato varieties grown in the province. The 2012 seed potato crop, which had similar acreage compared to 2011, saw harvest completed by the second week of October. Yields for all varieties are considered normal and quality is rated as excellent.

By mid-October, harvest of the potato main crop was virtually complete and those few unharvested acres held late-maturing varieties that needed more days due to late seeding. The B.C. main storage crop entered into storage in excellent condition and in the coming months a good supply of high-quality red, yellow and russet potatoes will be available.

MANITOBA

**Garry Sloik, Manager
Keystone Potato Producers' Association**



The year 2012 will go down as the year that separated the "irrigators" from the "drought-proofers"—producers that had sufficient water to raise a crop using irrigation versus producers that supplemented rainfall with enough irrigation to avoid a 1988- or 1989-level drought.

The production year started out well with dry, workable soil corner-to-corner on all fields that led to the earliest planted crop in memory. However, those conditions were largely due to low or no snowfall that left very dry sub-soils that needed irrigation early and often. The lack of snow also drastically reduced any run-off water to fill many of the retention ponds used for irrigation. The combination of low rainfalls (about 60 per cent the normal rate for Portage la Prairie, Man.) and warmer than normal weather conditions meant the crop's water demand was significantly higher than normal and more than some irrigation systems could accommodate.

The result will be large yield and quality differences from area to area and even field to field. In general, the yield and quality of Ranger Russets, Umatilla Russets and Innovators will be higher than Russet Burbanks.

As producers' thoughts have strayed toward drainage and tile drainage during the past few winters, we fully expect increased irrigation will be a major focus for the winter of 2012/13.

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**Gary Linkletter, Chair
P.E.I. Potato Board**



From a production point of view on Prince Edward Island, the weather has been the number one story of the year. Rainfall was extremely variable and in short supply during July and August, while in September and October, excessive rainfall meant that some potatoes were left in the field and harvest progressed at a slow pace. As fall *Spud Smart* goes to press, we are hoping for a stretch of clear days in the second half of October to get the crop in the warehouse. Yield on the early crop was somewhat disappointing due to the dry conditions this summer, and yield of maincrop varieties was variable across the province depending on local weather conditions. As we move from harvest to shipping season, our attention will turn to marketing the crop at a profit. This will be another challenge to face this year, due to the acreage increase and resulting large crop in the United States.

P.E.I. potatoes have already been moving onto the export market into the United States, Ontario and Quebec. The marketing season will kick off in November with P.E.I.'s annual presence at the Royal Winter Fair in Toronto. We will be launching our updated website and continuing in our work to engage consumers in our online activities, through Facebook, Twitter and Youtube, and the operation of our "Pack Your Appetite" online contest to win a vacation for four to P.E.I.

The Annual General Meeting of the P.E.I. Potato Board will take place on November 16, 2012 in Charlottetown. Growers will be provided with reports on Board activities, U.S. and Canadian production estimates and marketing updates.

NEW BRUNSWICK

**Joe Brennan, Chairman
Potatoes New Brunswick**



The 2012 growing season in New Brunswick was generally very dry. The last week of June saw significant rainfall in the Saint John River Valley, the province's "potato belt." Some areas received up to 10 inches of rain that week. Throughout July and August, it was very dry and warmer than normal. Rainfall was extremely variable, with the central area, from Hartland to Perth Andover, being the driest. Areas to the north and south received more showers and have consequently harvested better crops. The dry weather resulted in very little late blight disease pressure this year, a huge relief following the very wet season of 2011.

Harvest got underway a bit later than usual as growers tried to squeeze a bit more yield from the fields, particularly in the central region, where the lack of rainfall hampered bulking. However, since the beginning of October, the weather has changed! We have had several frosts and some very wet weather. On October 14 we had our first snowfall of the season—but it's not time for that. Harvesting is approximately 75 per cent complete, with some growers finished while others with later processing varieties have significant acres still in the ground. Yields have been as variable as the rainfall. Areas that "caught" rain at critical times are experiencing very good yields, while others are getting significantly smaller yields.

There have been no quality problems to date as a drier season generally means fewer quality/storage problems than in a wet season. Overall, I expect we will have a lower-than-average crop to market this year. The market is under the same pressure that exists across North America, but at this time, growers are focusing on getting this crop under cover.



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Know Your Enemies

Storage diseases can be headache-inducing, but with the right strategies, growers can keep on top of potential problems this fall.

WHEN PREPARING for the storage season, loss of potatoes is one of the main problems that growers have to contend with annually. There are a number of causes for loss of potatoes during storage, including respiration, transpiration and—very often—disease.

Spud Smart consulted with Khalil Al-Mughrabi, pathologist at the Potato Development Centre of the New Brunswick Department of Agriculture, Aquaculture and Fisheries, about the most common storage-related diseases growers need to take particular note of this coming season, and information on preventing and managing these diseases.

According to Al-Mughrabi, the most prevalent storage diseases in Canada are fusarium dry rot, bacterial soft rot and silver scurf. Late blight of stored potatoes is common in years when there have been incidences of foliar late blight disease. He points out that tuber diseases in storage may often originate in the field and then spread to healthy tubers through natural or mechanical wounds, such as bruises, cracks, abrasions or damage caused by the disease itself. Such wounds allow the pathogens to penetrate healthy tubers, proliferate and produce an abundance of spores or cells that can cause more infections under favourable storage conditions.

The Line-up

The term storage rot refers to a common group of diseases that in most cases is difficult to manage. There are several strategic measures that can help growers limit the spread of pathogens from diseased to healthy tubers. But first, the disease line-up:

FUSARIUM DRY ROT is a disease that affects tubers in storage and seed pieces after planting. It often begins from external wounds and subsequently results in dry and crumbly, tan to dark brown decay. Rotted tissue often forms internal cavities lined with fungal mycelia and spores of white to orange or yellowish-tan in colour.

SOFT ROT is a bacterial disease which often causes secondary breakdown of already infected tubers, says Al-Mughrabi. “Infected tissues are extremely soft and often appear as tan- to brown-coloured, water-soaked areas or granular tissues,” he points out. “Although rot caused by the soft rot bacterium is relatively odour-free, secondary organisms usually cause a foul smell. Under most storage conditions, tubers infected with any storage disease except silver scurf can be susceptible to soft rot, causing further breakdown of affected tissues. In a potato pile,



Bacterial soft rot causes secondary breakdown of already infected tubers.



Pink rot-infected tubers have dark outer skins.

soft rot spreads downward, potentially leading to the breakdown of the entire pile within a few days.”

SILVER SCURF is a storage disease which is causing increasing concern for storage operators in Canada. This disease causes external skin blemishes ranging from grey to silver in colour. Al-Mughrabi points out that under humid storage conditions, the primary lesions produce secondary lesions and the problem becomes severe, sometimes within a short period of time. “Virtually the entire tuber surface can be covered, and eventually water loss from affected tubers increases, resulting in shrinkage and deformation of the affected tubers,” he says.

LATE BLIGHT attacks both tubers and foliage at any stage of development and causes dark external skin discoloration.

Photos courtesy of the New Brunswick Department of Agriculture, Aquaculture and Fisheries.

The internal flesh of tubers tends to show reddish or tan brown, granular, internal dry rot. Depending on the length of infection, peeling of skin over the affected area and soft rot development—due to secondary infections—can also be observed.

PINK ROT is a fungal disease most often seen at harvest which results in dark outer skins in infected tubers. Diseased tubers can affect healthy tubers at harvest or at bin filling. “Although infected tubers maintain a normal shape, the internal flesh has a rubbery texture and turns pink after 15 to 20 minutes of exposure to air. In addition, due to breakdown of tissues by the pathogen and secondary organisms, pink rot in storage is often accompanied by a distinctive ammonia odour,” says Al-Mughrabi.

PYTHIUM LEAK is another common storage-related disease. This disease causes dark grey, brown or black rot or water-soaked interiors of tubers, often margined by a dark line. When infected tubers are cut and squeezed gently, a clear liquid comes out.

BLACK DOT is most observed on tubers but can affect all parts of the plant. The disease causes lesions on tubers very similar to those of silver scurf, says Al-Mughrabi. With the aid of a magnifying lens, growers will notice small black sclerotia visible within the lesions.

Living Organisms

According to Al-Mughrabi, prevention of potato storage diseases requires a combination of both cultural practices and fungicide programs. “Avoiding tuber damage during harvest can reduce disease problems in storage,” he says. “Potatoes can be treated with specific fungicides and disinfectants as they are being loaded into storage to protect them against diseases. Consult your local potato specialist for up-to-date recommendations on registered and effective post-harvest products.”

All conditions that influence storage disease development should be properly managed. Grading out damaged or diseased tubers before they enter storage is important, and in most cases essential, to prevent the spread of disease within the storage facility. Storage bins and farm machinery should always be thoroughly washed and disinfected before the new crop is harvested and stored.

“Growers should always keep in mind that harvested potato tubers are living organisms and hence interact with the surrounding environment,” Al-Mughrabi points out. “To maintain healthy potatoes during storage, the storage environment must also be managed effectively to minimize tuber deterioration. Temperature, humidity and air movement can always affect the keeping quality of stored potatoes. When potatoes are not properly stored, tuber losses due to fungal and bacterial infections can be high.”

Temperature is the single most important factor in maintaining the quality of stored potatoes, according to Al-Mughrabi. The majority of storage diseases are partially or completely inhibited by storage temperatures below 7.2 C, depending on the variety. At temperatures above 10 C, the growth and development of disease organisms increases dramatically, augmenting the risk of total breakdown.

“Risk of breakdown is greatest just after the storage has been filled, especially during hot weather,” says Al-Mughrabi. Temperatures above 10 C should be avoided during long-term storage of potatoes. The hatching of flies is also inhibited below 10 C—in other words, the presence of flies indicates that the




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“Growers should always keep in mind that harvested potato tubers are living organisms and hence interact with the surrounding environment.”

Khalil Al-Mughrabi

temperature is too high somewhere in the storage facility, and breakdown may become a problem sooner rather than later.

Proper air movement in a storage facility is another essential element to ensure successful storage management. This includes both “through-the-pile” ventilation and “over-the-pile” ventilation, or recirculation. Through-the-pile ventilation is necessary to dry and cool the potatoes, supply fresh air, and remove carbon dioxide, volatiles and excess heat and moisture from the storage. Recirculation aids in maintaining uniform temperature conditions throughout the storage and sweeps moisture from the walls and ceiling.

A storage facility with inadequate insulation or poor air circulation may experience excess moisture build-up. Al-Mughrabi points out that this is a problem which can lead to water dripping on the pile—and this must be avoided at all costs in order to minimize the danger of rot. “Adding extra insulation and placing fans above or on top of the potato pile will improve air circulation and help eliminate condensation problems,” he says. “Overfilling the storage hampers air flow and increases the chances of tuber breakdown from soft rot and pink rot. There should be at least 0.6 metres, or two feet, between the top of the pile and the storage ceiling.”

A good storage management program should include daily checks of the storage, Al-Mughrabi advises. Storage operators must make sure that the ventilation controls and dampers are

functioning correctly, especially during very cold weather when the danger of ice build-up is greatest.

“Use an accurate thermometer to check the air and tuber temperatures at several locations in the storage,” he recommends. “A thermometer or temperature probe located 50 to 100 centimetres below the top surface of the pile will give an indication of the highest temperature in the storage. Relative humidity can be checked at the same time with a humidity gauge or psychrometer. Be alert for the signs of soft rot development—a pungent smell, depressions in the pile, water in the ventilation ducts and hot spots in the pile.”

According to Al-Mughrabi, early detection of soft rot is now possible with the use of infra-red thermometers. These devices, which look like radar guns, can be used to measure temperatures at the top of the pile. Areas of potential breakdown will show up as hot spots, often as much as three weeks before other symptoms are noticeable. He recommends that growers make sure to keep records of all storage conditions on a daily basis so that if problems arise there is some way of determining the cause.

One of the key principles of successful potato storage has always been prevention rather than cure. Growers should keep in mind that a diseased potato going into storage cannot be cured, but a healthy potato can maintain its quality with proper management. **Lukie Pieterse**



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MAXIMIZING EFFICIENCY and longevity are the driving forces behind a new potato storage facility that is being built at Gerrit Visser and Sons potato farm at Orwell Cove, P.E.I. “We are building a storage that is intended for long-term use,” says Randy Visser. “We are trying to maximize everything and make everything as efficient as possible. It’s the reality of the industry that there is much more concern with the quality and consistency of the product than in the past, and if you are not on top of that it’s not going to be too long before you start to fall behind.”

The Vissers’ investment starts with the building itself, which has been designed to last and remain as airtight as possible. The building is an insulated concrete form structure, which consists of Styrofoam blocks on the outside and inside and a concrete wall in the centre. The concrete provides the structure with strength and a tight seal.

“We have gone with a six-inch concrete wall in the centre, and that keeps air movement down to almost nothing,” says Visser. “Then the Styrofoam on the outside and the inside makes for a really airtight, well-insulated building that is structurally strong, so it should be able to withstand a lot of weight from the potatoes and any strong winds from outside. We anticipate the life span of this building should be a lot longer than a traditional stick frame building.”

The new, 16,000 square-foot storage facility has the capacity to handle six million pounds of potatoes, and is designed to provide operators with the ability to reduce the pile height to prevent problems with pressure bruising in the lower parts of the storage bins.

The desire for a well-sealed, long-term storage has carried over into the design of the ceiling, which incorporates a layer of spray foam between the ceiling and the layer of blow-in insulation to create an airtight seal and prevent condensation problems. Extreme temperature differences between the building’s inside and the outside environment can cause condensation issues, and if moisture gets into the attic insulation it reduces its effectiveness. “The whole idea is to put this spray foam in and make it very airtight so there are fewer losses that way, and move the dew point such that the likelihood of any condensation in the attic is almost none,” says Visser.

The new ventilation system comes from the Dutch company Omnivent, and is the first installation of its kind on Prince Edward Island. The system uses more airflow—about two to three times as many cubic feet per metre as traditional systems—to more efficiently control the humidity in the storage.

“We are hoping that increase in CFM capacity, along with the more advanced sensors and controls in the system, which monitor humidity and temperature, will allow us to vent at optimum times with more air, but less often, and in less time,” says Visser. “That should make for a potato with less shrink, less pressure bruising and better quality.”

Long-Term Investment

Visser's system, which was shipped from Holland, certainly isn't the cheapest, but the company's intent isn't to compete on price, says Paul Kok, North American sales manager for Onmivent. "Our system is more costly than a traditional, standard system that you can get in Canada, but we always talk about the longer-term return on investment," says Kok. "If you have a bin that goes bad and you have to deliver it in January with 15 per cent losses because of bacteria or wet tubers, if you could have saved that pile and kept it until June or early July and delivered it, that initial investment would have paid for itself in one season."

The Onmivent system offers a number of advantages based on maximizing operational efficiency and achieving a better-quality product at the end. The main benefit, says Kok, is that the system ventilates with more air capacity. "There is better management of risk to minimize dehydration losses during storage and maximize your storage period," says Kok, who adds that the advantage of the Onmivent system demonstrates its superiority to conventional systems when there are problems.

"A traditional system uses low volumes of humidification, which also minimizes dehydration," says Kok. "But minimum ventilation rates don't give as much control of your crop when there is breakdown or when you have a wet crop inside the bin. With the Onmivent system there is more flexibility because you can switch off some fans when you don't need total capacity."

The Onmivent system is able, due to the higher air capacity, to lengthen the window of opportunity to use outside air rather than refrigeration, a window that closes rapidly as temperatures begin to warm up in the spring.

"When the time window closes as outside temperatures increase, you can still ventilate with outside air without having to use refrigeration equipment," says Kok. "You have more control and fewer energy costs to push that cold air through your crop. If we ventilate with twice as much air capacity it means that we can halve the amount of time it takes to cool down the crop, so if nighttime temperatures go up, but they are still lower than the temperature of the crop for, say, four hours, if we ventilate with 60 CFM, we only need four hours to cool the crop. With a traditional 30 CFM system you would need eight hours, and you could run into difficulty if you don't have that time window available. Then you would have no choice but to turn on your refrigeration equipment."

Before making his decision to go with the Onmivent system, Visser visited the farm of Jake Hoogland, who is also a dealer for Onmivent, and has installed a similar system on his farm in Alberta. "We talked to him and went out and visited his place early last spring and went through his system, which was a bit different because they typically have more box storage in Alberta, but it gave us an idea of what the system could do," says Visser.

Visser intends to conduct a comprehensive study of the new storage facility and compare its performance to the conventional storage systems on his farm to determine whether or not the expected advantages play out in reality. He's fairly confident that the system will give him more flexibility and a better product in the end. "It is a big investment, but the hope is that over the years it's going to pay for itself in quality and better storability," he says.

Angela Lovell

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TILLAGE



Photo Phcoursity of Horsch Anderson.

The Joker's 20-inch notched disks are designed to rotate faster than traditional disks.

HORSCH ANDERSON is offering Joker, a high-speed, versatile new tillage tool. Suitable for use both in the spring and fall seasons, the Joker offers a wide variety of applications, including residue mixing, field conditioning, seed bed preparation and fertilizer incorporation.

The Joker's 20-inch notched disks are designed to rotate faster than traditional disks, allowing the machine to complete fields in half the time or less on a per-foot basis than other tillage products. However, one of its greatest benefits, according to Louis Claassen, who grows potatoes near Vauxhall, Alta., is its adaptability.

"We use [the Joker] in the fall for stubble control and also after the potato harvest, to work the fields and cut the vines," says Claassen. "We also use it for preparing the fields for the winter. I think I use the machine on every field, sometimes two to three times a season."

"It's more accurate for depth control [than other tillage products], and you're also able to use it in the spring for seed bed preparation. The machine really shines in wet conditions. We've used it over quite a few springs. You can't wait for every spot to dry out—sometimes you have to just go, and this is the machine for that."

The Joker is available in the MT series with 13 to 20-foot working widths, the RT series with 23 to 37-foot working widths, and the PT series with 30 to 40-foot working widths.

For more information, visit horschanderson.com.

SUGAR ANALYSIS

TECHMARK INC., the Lansing, Mich.-based agricultural engineering company, is offering the Techmark Approved Laboratory Program for sugar analysis and quality control for pre-harvest and storage potatoes.

The program is currently offered out of two locations in Canada—the Alberta Potato Lab in Taber, Alta., and at Southern Manitoba Potato Company near Winkler, Man. Growers can send samples to these locations or contact Techmark to set up a Techmark Approved Lab at their own operations.

Once a lab is set up, Techmark offers technical support along with a web-based reporting system to which growers upload data from their sugar and fry analyses. The program allows growers to view historical data and regional averages for their crop. "We analyze the data, and then we work with growers to maintain or improve the process quality of their storage crop," says Patrick Morris, laboratory manager at Techmark.

"Sugar analysis in storage [potatoes] is important," he says. "Reducing sugars fry dark and cost growers money by reducing process quality. Sugar analysis can be used to create the best storage management plan for a grower's crop."

The Techmark ChipPro consulting program is a compliment to the lab program. In ChipPro, Techmark works with the grower to create a storage plan and through monthly consultations reviews new data and suggests best storage management for the crop. According to Morris, high process quality is the goal of both programs.

Call Patrick for more information at 1-517-322-0250.

Photo courtesy of Techmark Inc.



Techmark Approved Labs use lightboxes to take consistent photos of processed potatoes for quality evaluation.

LOADING

LOGAN FARM Equipment is offering the Logan Load Pro 2000 series of live bottom truck boxes, "the best-built, best-operating and lowest maintenance boxes on the market," according to Dave Gallant, owner of Winnipeg-based Gallant Sales.

"Logan has taken what they felt were the best features of live bottom boxes throughout the industry, added their own ideas for improvements and rolled them all into this superior design," says Gallant.

According to Gallant, many of the other boxes on the market are prone to cracking in critical areas, and may require periodic trips to the welding shop. This quite often involves complete removal of the box from the truck in order to gain access to the defects. "That literally does not occur on these boxes because of the superior design and construction—for example, only full length steel is used, no welded seams," says Gallant.

The truck boxes are available in electric and/or hydraulic drive models, in sizes ranging from 20 to 30 feet. According to Gallant, these boxes will improve growers' bottom line due both to their low maintenance and their faster unloading times, which equate to faster turnarounds times, and which, over a larger fleet, may also equate to fewer trucks and fewer drivers.

View these Logan boxes at gallantsales.com or call Dave at 1-204-254-8126.



Photo courtesy of Dave Gallant.

Logan Load Pro 2000 series live bottom truck boxes require less maintenance than other boxes on the market.

MONITORING

COLE-PARMER is offering its Testo Pocket Line Thermo-Anemometer with Humidity to potato growers this storage season. The handheld device uses professional-grade sensors to monitor heating, ventilation and air velocity conditions, and displays the information on a large backlit screen.

The device can be used in many industrial applications, but it has unique potential for the potato industry as well, according to Michael Knapp, product manager for Cole-Parmer. The thermo-anemometer could be used as a backup to quickly check temperature or humidity in any potato storage facility, and is small enough to conveniently be carried in a jacket pocket. "Potato growers have to be very careful what the conditions are where the product is being held," says Knapp. "This kind of product would be ideal for them to take out in their pockets and check to see if it's getting overly humid [in the storage facility]."

"It's designed for someone who isn't necessarily an expert on wind and weather, to be used as a tool," says Knapp. "It's rather inexpensive for something that does so much—it achieves this by using an electric component that's very sensitive to temperature. You can measure temperature at a small footprint and very accurately."

The meters come with a convenient soft carrying case with belt clip as well as a hard cover for protection against dirt and impact.

For more information, visit coleparmer.ca.



Photo courtesy of Testo, Inc.

The meter is small enough to be carried in a jacket pocket.

For more information on the products listed or to submit new E&T product offerings, email [Julienne](mailto:Julienne@jisaacs@issuesink.com) at jisaacs@issuesink.com.

Tackling Acrylamide

Acrylamide is causing concern in the industry, but there may be hope on the horizon in the form of new acrylamide-preventing technologies.

TT



By Lukie Pieterse

Lukie Pieterse is a consultant and writer with decades of experience in the potato sector, from growing his own drip-irrigated potatoes to writing international potato news. Tuber Talk is an insider's take on the issues impacting the industry.

THE TERM “ACRYLAMIDE” has been showing up in mass media reports since 2002. Dietary acrylamide has become an area of concern for consumers, the food industry and regulators due to its carcinogenic potential for humans. What is acrylamide, how did it become such a hot topic of discussion, and are there any solutions for the supposed health risks that it poses?

Research

The potato industry has reason to be concerned about acrylamide. In April 2002, a team of Swedish scientists announced the discovery of significant quantities of this chemical compound in a variety of baked, fried and toasted foods—in particular, potato chips and french fries. In June of that year, the Food and Agriculture Organization of the United Nations and the World Health Organization, which has classified acrylamide as a probable human carcinogen, established an international network on acrylamide in food. The network's aim is to “allow all interested parties to share relevant data as well as information on ongoing investigations.”

Acrylamide can form in some foods during high-temperature (over 121 °C) cooking processes, such as baking, toasting or frying, from naturally-occurring sugars and the amino acid asparagine. This is part of the Maillard reaction, or browning reaction, and research to date indicates that carbohydrate-rich foods such as potatoes and cereal foods are particularly susceptible to acrylamide formation.



While significant above-average acrylamide intake has been found to produce cancer in laboratory rats, scientists are just beginning to associate cancer risks with exposure to dietary acrylamide. And while no regulatory authorities around the world have yet set a limit for the quantity of allowable acrylamide in food, many have stated that they wish to see the dietary intake of acrylamide reduced.

It is becoming increasingly clear that solutions must be found to reduce the formation and level of acrylamide in processed food. The acrylamide “scare,” together with other challenges, such as the popularity of low-carb diets, is having a negative impact on the image of potatoes among consumers, and the potato industry has been working hard to counteract a decline in potato consumption.

Dedicated research efforts are ongoing within the potato industry around the world to find solutions for the possible reduction of acrylamide formation via improvements of the raw product. Selecting potato varieties with naturally low levels of sugar for potato chips helps control the formation of acrylamide when they are processed; also, decreased bruising of raw potatoes before processing appears to have positive results.

Technological Solutions?

Several commercial companies in different countries have invested in research initiatives to find product solutions to counter acrylamide formation in the potato-processing industry.

One such company is Functional Technologies Corporation, a Canadian company based in Vancouver. Functional Technologies specializes in developing product solutions which prevent the formation of naturally-occurring toxins and contaminants that either affect final product quality, or are classified by the World Health Organization as probable human carcinogens. The company has developed a proprietary acrylamide-preventing yeast technology platform, Acryleas[®], for application in the processed potato industry.

According to industry literature, methods that can help counter the formation of acrylamide include changing cooking time and/or cooking temperature; however, these methods are considered less effective than Acryleas[®], and potentially compromise the sensory characteristics of the final product.

In essence, the Acryleas[®] product accelerates the natural ability of yeast to consume asparagine, thereby preventing the formation of acrylamide during potato processing. Functional Technologies is working to validate and maximize the performance of Acryleas[®] in various processing protocols for potato foods and snacks, including battered products.

"We are always mindful that it is a privilege and a responsibility to be working with large food suppliers and producers in dealing with an undesirable food attribute that has caught their attention as well as the consuming public's," says Howard Louie, chief business development officer of Functional Technologies. "The adherence to our mandate of producing a highly efficacious product while allowing the yeast to function as it would naturally function, but with increased performance, has been a challenge that our technical team has more than met, as evidenced by the stellar test results we have experienced and published," he says.

Trials with baked goods and snack foods conducted in both North America and Europe with Functional Technologies' acrylamide-preventing yeasts have demonstrated up to 95 per cent asparagine and/or acrylamide reduction. "These results provide strong support that industrial potato-processing protocols will be able to benefit from our Acryleas[®] platform," says John Husnik, senior scientist at Functional Technologies.

Scientists, industry, and government continue to investigate the possible effects of acrylamide in food and to search for solutions. But potato industry members should also stay vigilant, monitoring potential market impacts and actively collaborating on solutions for the industry.

Potato Protection



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World Review

NEWS & INSIGHTS FROM AROUND THE GLOBE.



Credit: Photo courtesy of John Marshall, WCF Phoenix

Potato production has faced difficult challenges this season in the United Kingdom.

Glum Outlook for European Potato Crop

POTATO PRODUCTION has faced difficult challenges this season across Europe as well as the United Kingdom. Extreme weather conditions have been commonplace with variable yields, sizes, quality and availability of potatoes among the key concerns experienced this year. Total plantings were down in countries comprising the North-Western European

Potato Growers, while yields are also expected to be lower in each country. The NEPG, representing the five leading potato-producing countries (Belgium, France, Germany, Great Britain and Holland), has estimated that the total table and processing potato harvest could be 22.9 million tonnes—14.5 per cent lower than last season. The estimate was made at the NEPG's last meeting on September 11, held at Villers-Saint-Christophe, France, during Potato Europe 2012. Although the lower area and yields are resulting in a strong market price, not all growers will benefit. A large part of the NEPG harvest is contracted against fixed prices and with lower-than-average yields expected, lower volumes may be available for free-market use. The NEPG expects high demand this season from the processing industry and export markets. The raw material processing requirement for Belgium and the Netherlands may, for the first time in history, be higher than the estimated total harvest in these countries. Therefore, imports from neighbouring countries are likely to be required.

Source: Euro-Potato

GM Potato Research Update

Research on genetically modified potatoes continues in several European countries, despite resistance from environmentally-conscious groups. One year after the protest against GM test fields in Belgium, the Flemish Institute for Biotechnology (VIB) has been given the green light for a second phase of research. The VIB test trials are being conducted in collaboration with BASF, the Ghent University and College and the Institute for Agricultural and Fisheries Research. In May last year, the go-ahead was given for trials on GM potatoes resistant to late blight to test

the activity of various combinations of resistance factors under Belgian soil and climate conditions. At the time, protesters from the Field Liberation Movement destroyed a large section of these fields, leading to continued resistance toward GM potatoes.

In early September it was reported that a trial plot of GM potatoes at Norfolk's John Innes Centre in the United Kingdom, designed to test the potatoes' ability to withstand late blight, has demonstrated some success. The test plants have withstood "the worst attack of late blight seen for decades," according to a spokesperson for the research team. The trial, now in its third year, involves a total of 192 potato plants. According to the team lead, Jonathan Jones, late blight "was wreaking havoc in all the plants that are non-GM." The project team plans to submit a report on the trials to the Royal Society's proceedings journal later this year once the full results have been analyzed.

Research into the development of new potato varieties resistant to late blight is also ongoing at Wageningen University in the Netherlands, reportedly with promising results. The Wageningen GM potatoes were developed through "Cisgenesis," a novel technique that is being used by researchers to breed new varieties. Cisgenesis differs from "transgenesis," a technique which involves the use of genes from foreign species in developing new plant varieties. The genes used for breeding the Wageningen potatoes are derived from wild potatoes resistant to *Phytophthora infestans*.

A controversial study into the environmental impact of GM potatoes in Oak Park, Carlow, Ireland began in August, led by the agricultural development body Teagasc. A total of 24 GM potato plants

with improved resistance to late blight were planted alongside conventional potato plants. The study will examine the impact of the GM potatoes on the soil, particularly on its bacterial, fungal and earthworm diversity. The trial was widely criticized by environmental groups and organic producers when it received permission to proceed from the Environmental Protection Agency in July.

Sources: *Expatica / Eveningnews24.co.uk / Vroege Vogels / The Irish Times*

Novel Potato Apps

In the United Kingdom, British farmers growing potatoes for PepsiCo's Walkers Crisps are trialing a new smartphone app this season. The app is designed to help them better predict future harvests and improve the sustainability of PepsiCo's supply chain. Using the app, growers can easily photograph and analyze the ground coverage of the potato leaf canopy to accurately predict crop development—a job that until now has been carried out

manually. The tool was developed by researchers at Cambridge University and digital mapping company Landmark on behalf of PepsiCo, as part of the food and drink giant's efforts to cut its carbon emissions and water usage in water-stressed areas. The app enables farmers to more accurately forecast crop yield using digital images and modeling techniques, according to David Firman, who led its development at Cambridge University. By more closely monitoring crop health, PepsiCo predicts farmers will be able to optimize water and fertilizer use on their crops, delivering net savings over time.

Plant pathologist Leah Tsrer at the Agricultural Research Organization, Volcani Center in Bet-Dagan, Israel, recently made available an app that identifies potato pests and provides information on diseases and disorders with accompanying images that can be magnified to view details up close. The app is said to be a practical tool for farmers, advisors, researchers and students. It is compatible with iPhone 3GS, iPhone 4, iPhone 4S, iPod touch and iPad.

"Spray Guide," developed in cooperation with Simplot and Precision Laboratories in the United States, is an app that can quickly and accurately identify the ideal mixing order of crop protection products. The app is said to be the first of its kind designed to help users with proper tank mixing sequences and to maintain accurate spray logs for easy record keeping. Handheld devices can be used to instantly document and share data on products sprayed, location and weather conditions. The spray log features a stopwatch to record start and stop times as well as total spraying times. The app has other valuable features, such as weather information, which helps growers reduce spray drift risks by relaying and capturing weather conditions prior to spraying. The app is suitable for iPhone and Android smartphones.

Sources: *Business Green / Leah Tsrer / Simplot*

Lukie Pieterse
Industry Consultant and Writer

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Production estimates have returned close to five-year averages. The quality of the Canadian crop is good overall, and pricing is at respectable levels across the country.

RECENT PRODUCTION

estimates from the United Potato Growers of Canada indicate that across Canada, production has returned close to the five-year average. One year ago, production was significantly reduced in many areas due to weather-related issues. For the 2012 crop, according to Kevin MacIsaac, general manager of UPGC, "we had started our projections using average numbers, but we lowered them quite dramatically in the middle of the summer, because a lot of the growing areas were under too little moisture." Closer to harvest, he says, "we've increased the numbers a bit because a lot of areas had some rainfall." At the end of September, estimated fresh production stood at 23,981,000 hundredweight with total production estimated at 98,910,000 cwt overall, compared to 95,844,000 cwt last year.

More concerning to UPGC than acreage was yield at the beginning of the season, says MacIsaac. "Almost every area thought they'd be looking at a lower level of marketable potatoes off the acre," he says. "Some areas were too dry, in some areas the size profile [of the potatoes] was smaller, and some areas were getting too much rain. Even though we hadn't increased our acreage at the start, we were concerned that if we had average to above-average yields, we'd have an issue, but that hasn't happened."

In terms of marketing, MacIsaac anticipates an upswing in potato sales during the fall season. "You can almost see it change when kids go back to school, and we always see a bump at Thanksgiving

and Christmas," he says. "Right now, for what we're putting into the marketplace, prices are reasonable. The recommended price in Ontario would be \$2.30–\$2.50 per 10-pound bag, and this is about the same in Quebec and Prince Edward Island. Most areas have a good level of pricing."

In terms of supply, the picture is still positive, MacIsaac says. "We really should be pretty well matched for our supply in Canada compared to what we need. I guess the issue will be what happens in the United States—they have a significant increase in potatoes to market [this year], more than last year. Probably, a little later in the season, we in Canada will see some effects of that."

Estimated Canadian Production, September 2012 ('000 cwt)

Province	2012 Est. Total	2011 Est. Total	2012 Est. Fresh	2011 Est. Fresh
NFLD	105	105	105	105
P.E.I.	23,718	24,633	6,625	7,616
NB	14,178	12,376	2,650	2,841
NS	380	418	13	14
Que.	10,846	11,826	5,750	6,680
Ont.	7,164	6,598	3,798	3,035
Man.	19,760	19,240	2,080	2,078
Sask.	1,742	1,820	1,040	600
Alta.	19,369	17,120	758	523
B.C.	1,649	1,708	1,162	1,424
Total	98,910	95,844	23,981	24,916

Source: United Potato Growers of Canada



"RIGHT NOW, FOR WHAT WE'RE PUTTING INTO THE MARKETPLACE, PRICES ARE REASONABLE."

Kevin MacIsaac, general manager of UPGC

IN THE UNITED STATES, production is up, with an estimated 8.7 per cent increase over last year, according to early October estimates in Bruce Huffaker's North American Potato Market News. According to the report, U.S. export sales surpassed last year's sales at this time by 16.4 per cent, with increases in both fresh and frozen export categories. A decreased European crop this year may drive some North American exports, writes Huffaker. "Increased North American potato production may allow the U.S. and Canada to fill the gap left by Europe's smaller crop. However, the potatoes are not all in ideal locations to use for export production. Production capacity constraints also may limit this year's exports."

New DMN Products Extend Natural Dormancy of Potatoes

1,4-DMN potato dormancy enhancers registered for Canada.



TWO NEW PRODUCTS THAT ENHANCE the natural dormancy of stored potatoes are now registered for use in Canada. Following years of research and use by growers and shippers, these 1,4-DMN based products have proven to be successful in controlling sprouts while maintaining the "field freshness" of potatoes.

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"1,4 GROUP's DMN products have been a long time component of our storage treatment plans. Spuds treated with 1,4SIGHT® in combination with CIPC® result in better sprout control and improved quality out of storage. I apply it in the fall or early spring in storage, depending on the natural dormancy of the variety. They hold better and seem firmer with fewer sprouting problems."

"We also use 1,4SHIP®, an in-transit sprout treatment, to extend dormancy and aid the appearance of shipped potatoes."

-Kent Peterson, Kemco/Wada Farms



"We have used 1,4GROUP's DMN products for several years. We apply 1,4SIGHT® shortly after we place our potatoes into storage. It helps control sprouts and extends dormancy, safeguarding the potato quality into late summer. 1,4SEED® is applied to our seed potatoes when sprouting gets out of control. It works great."

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at the root

keeping up with the potato industry



People News

KOK RETIRES AS SECRETARY OF UPGC

Ray Keenan, chairman of the United Potato Growers of Canada, recently presented Edzo Kok with a certificate of appreciation for his years of service as secretary of the organization. Kok, of Taber, Alta., joined the Potato Growers of Alberta as its executive director four years ago, bringing with him over 30 years of experience to the potato industry. Kok has had a diverse background working for McCain Foods, with his last posting being in New Zealand.

Product News

FMC EXPANDS AGRICULTURAL PRODUCT LINE

Canadian growers now have additional options when it comes to their weed and insect management programs. FMC of

Canada Agricultural Products Group has made new solutions available to growers, providing them with additional modes of action to combat resistance throughout the Prairie provinces. FMC products in Canada now include Aim herbicide, Beleaf insecticide, Command herbicide, Pounce herbicide, Ranman fungicide and Rovral fungicide. Available through FMC's partners across the country, these products are designed to protect pulse crops, sunflowers, potatoes, sweet potatoes, cucurbits, carrots, cereals, soybeans and more.

JETHARVEST SOLUTIONS NOW OFFERING BIO-SAVE IN CANADA

Jet Harvest Solutions, a Florida-based company dedicated to the development and use of agriculture biological products, is now marketing the bacterial



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biofungicide Bio-Save in Canada. Canada's Pest Management Regulatory Agency has approved Bio-Save for use on potatoes in storage. Bio-Save is a freeze-dried (lyophilized), wettable powder fungicide used for the prevention of post-harvest decay in potatoes. The active ingredient is a bacterium called *Pseudomonas syringae* that naturally occurs on the surface of many agricultural plants. Bio-Save effectively limits decay caused by fusarium dry rot in cold and controlled atmosphere storage environments.

MONSANTO OFFERS ROYALTY-FREE ACCESS TO BIOTECHNOLOGY

Monsanto Company will provide a royalty-free research license to the academic community and other non-profit research institutions to a newly-issued U.S. patent related to the *Agrobacterium* transformation method. The announcement has the potential to further advance research and development of new technologies in row crops such as soybeans, cotton and canola, as well as specialty crops such as potatoes, alfalfa, tomatoes and sugar beets. "We hope that access to one of the leading agricultural biotechnologies can further both the enablement and development of key agriculture solutions for farmers and consumers alike," said Robb Fraley, chief technology officer for Monsanto and one of the leading scientists behind this discovery.

PRO HEALTH ADDS KWIK LOK TRACKERS TO POTATO PACKAGING

Pro-Health is bringing traceability to the forefront of the company's vision. Starting this month, customers will see new data matrix codes on the Kwik Lok closures for Pro-Health Russets innovation that offers unique insight into each product's story. By scanning the Kwik Lok's data matrix code with a smartphone, customers are taken to a landing page on Pro-Health.com that shows the exact field their potatoes were grown in. Each page includes the field's specific location, latitude and longitude, and information about the farm.

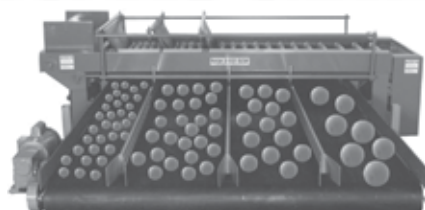
Business News

GROWING FORWARD AGREEMENT REACHED FOR CANADIAN AGRICULTURE

The federal, provincial and territorial ministers of agriculture have reached an agreement on the content of the Growing Forward 2 policy framework for the agriculture, agri-food and agri-products sector. The new five-year agreement includes investments in strategic initiatives of over \$3 billion for innovation, competitiveness and market development, including a 50 per cent increase in governments' cost-shared initiatives. The governments also agreed to continue to deliver a complete and effective suite of Business Risk Management programs to

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ensure farmers are protected against severe market volatility and disasters. Modifications to AgriStability and AgriInvest programs will ensure that Canadian producers continue to have access to a strong and effective suite of BRM programs. AgriInsurance, AgriRecovery and the Advanced Payment Program will continue to help farmers manage production risks and provide cash flow assistance. The next annual federal, provincial and territorial ministers' meeting will be held in Halifax in July 2013.

CAVENDISH FARMS NOW FUELLED BY CLEANER-BURNING NATURAL GAS

Cavendish Farms has officially opened its natural gas receiving station located at the company's New Annan site. The successful implementation of this leading-edge natural gas system generates thermal energy which fuels the company's potato processing plants and eliminates the use of 22 million litres of heavy fuel oil annually. "Cavendish Farms is making huge strides in the area of sustainability, and our move into the compressed natural gas arena supports our continued efforts to reduce the environmental

impacts of our operations in Prince Edward Island," says Robert Irving, president of Cavendish Farms. "Our fuel mix in New Annan is now 70 per cent natural gas and 30 per cent biogas, with heavy oil now only used as a back-up fuel source. Combined with our investment in our biogas facility, we've now achieved a net reduction of 50 per cent in our greenhouse gas emissions."

CFIA STREAMLINES REGISTRATION FOR SAFE FERTILIZERS AND SUPPLEMENTS

Effective immediately, the Canadian Food Inspection Agency will streamline the registration process for fertilizers and supplements. In an effort to focus its resources on verifying the safety of fertilizers and supplements, the CFIA will no longer be regulating product efficacy as of 2013. The streamlined registration process is an interim measure that will remain in place until the agency amends the Fertilizers Regulations to eliminate efficacy requirements. Under the streamlined registration process, foreign trial data or scientific literature will be accepted as evidence of efficacy.



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Investing in farming's future.™

Photo courtesy of Jean-Marie Pelletier.



Left to right: Jeannot, Marcel, Jean-Marie, Gerard and Rino Pelletier, and Marc Bard.

“The first year we built [the new facility], we had a big frost and we couldn’t dig for five days. We were able to bring back the colour in those potatoes and they stored for the winter.”

Jean-Marie Pelletier

State-of-the-Art Storage Saves Crops

JEAN-MARIE PELLETIER grew up surrounded by potatoes. It was hard not to, living in the northernmost point of New Brunswick’s potato belt, where the economy of his hometown, Drummond, is centred on potato production.

Growing up on his father’s farm, the fourth-generation farmer and his two brothers, Rino and Marcel, learned all about potato farming and, with potatoes in his blood, Pelletier purchased his own farm in 1976 in order to grow processing potatoes. He and his brothers, who also have their own farms, work closely together, sharing equipment and storage facilities, to grow three varieties: Shepody, Russets and Innovators. They also grow some seed potatoes for their own use, as well as grain as a rotation crop.

Between them, the Pelletiers grow 530 acres of processing potatoes, producing 132,000 hundredweight a year, primarily for McCain Foods. To produce the potatoes, the Pelletiers hire annually and rely on the help of Jean-Marie’s son Jeannot and son-in-law Marc Bard. Until McCain is ready to process their potatoes, the Pelletiers need to safely store them from the fall harvest to as late as June.

Until 2009, storage on Pelletier’s farm was limited to a small storage facility with no ventilation. That year, however, he invested in a new state-of-the art facility like the ones his brothers already had.

“The new facility has in-ground ventilation so we don’t have to deal with pipes on the floor,” Pelletier says. “In-ground is really expensive but it is a lot more convenient since we don’t have to move ductwork around.”

With two bins, each with the capacity to hold nearly 24,000 hundredweight of potatoes, the new facility means Pelletier can store 46,200 cwt—33,000 cwt more than his old, unventilated facility holds. He still uses the old storage for seed potatoes, but the processing potatoes go to the new facility, which Pelletier firmly believes has saved him crops.

“The first year we built it, we had a big frost and we couldn’t dig for five days,” he recalls. “We were able to bring back the colour in those potatoes and they stored for the winter. I don’t think we could have done that before.”

The new storage facility made a difference last year as well, when extremely wet weather threatened to rot the potatoes. “We were able to dry them out,” Pelletier says. “Without the ventilation, we would not have been able to do that.”

Saving those crops, and improving their quality, comes with a price—approximately half a million dollars to build the facility and monthly power bills between \$1,500 and \$1,800. When that figure is added to chemical, repairs and fuel expenses, the cost of production is high.

That cost is a challenge of farming—but its challenging nature is one of the aspects Pelletier likes about the career path he has chosen.

“It’s rewarding in the end,” he says. “Somebody needs to do it to feed people.”

Trudy Kelly Forsythe

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