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MARCH 2017

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THE SHOCK OF HIGH ENERGY BILLS

Capital flees Ontario to expand greenhouses in the U.S.



John Ketler, farm general manager, NatureFresh Farms, inspects peppers at one of their greenhouses in Leamington, Ontario. NatureFresh is one of several major greenhouse growers expanding in the border state of Ohio where a more favourable business climate encourages growth. Energy prices and the recent instalment of cap and trade taxes are contributing factors for the flight of \$220 million of capital from Ontario in the last five years. Photos by Glenn Lowson.

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KAREN DAVIDSON

In the year that the Ontario Greenhouse Vegetable Growers (OGVG) is celebrating a 50th anniversary, several of the largest growers are expanding south of the border. Mastronardi Produce, Red Sun Farms and NatureFresh have all built state-of-the-art facilities in recent years, but now Mucci Farms is following. High energy prices in Ontario are causing capital flight estimated at \$220 million over the last five years.

When asked why his

company decided to break ground this year on 25 acres in Huron City, Ohio, Bert Mucci said, "It's Ontario. Electricity prices, lack of infrastructure and now cap and trade are making it impossible to make money."

In the next three years, Mucci Farms will invest \$115 million US in Ohio. He estimates building costs at \$1.3 million US per acre. That price includes new lighting technology that allows them to grow year-round.

This migration of capital is alarming for Ontario's greenhouse vegetable industry,

which is nudging ever closer to \$1 billion in sales. In recent years, it has been growing at a rate of about six per cent per year says Rick Seguin, general manager (OGVG). Current statistics peg acreage at 2880 acres under glass and plastic, which includes 180 acres which came on stream in 2016. These acres are almost evenly split between tomatoes (1060) bell peppers (1038) and cucumbers (782).

This healthy industry is threatened with energy prices at historic highs, now that Ontario's cap and trade

legislation kicked in January 1, 2017. When energy invoices arrived this past month, it was impossible to discern the exact impacts of cap and trade because the cost is buried in the line item on delivery. This lack of transparency is aggravating for business operators who can't manage what they can't measure.

"More growth is planned for 2017, the result of decisions made two years ago," says Seguin. "But this year, growers may decide not to expand as energy prices go higher. Continued on page 3

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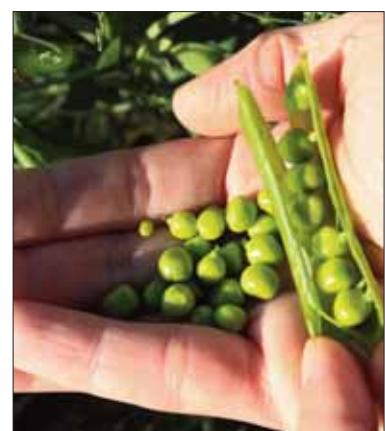
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AT PRESS TIME...

Contracts in hand



Growers of Ontario's processing vegetable sector are proceeding with contract negotiations despite industry turmoil. Al Krueger, assistant manager, Ontario Processing Vegetable Growers, confirms that Cavendish Farms has settled on onions, with prices up slightly from last year. Hartung Bros, a green shipper, has settled on hand- and machine-harvested cucumber pricing, down slightly from last year. No contracts have been settled with Bonduelle which processes about \$30 million of peas, sweet corn, beans, carrots and squash. March 1 is the deadline for negotiations with tomato processors.

Since last year, the Ontario Farm Products Marketing Commission has recommended that the \$100 million sector turn to direct contracting with processors.

"We're having a tough time with this concept," says

Krueger. "We don't understand what benefit there is. Why do processors want to direct contract?"

Ontario's agriculture minister Jeff Leal asked for an analysis of evidence for these proposed amendments. To date, there is no document in the public domain says Krueger.

The OPVG role is to negotiate prices, terms and conditions on behalf of growers. Processors then communicate with growers on such items as varieties, planting and harvesting dates.

Since Gerri Kamenz left the chairmanship of the commission in late 2016, Jim Clark is the interim chair. He is joined by vice-chair, Elmer Buchanan and the following directors: Valerie Hobbs, Bette Jean Crews, Robert Anderson, Dan Cohoe, Valerie Gilvesy.

Apple industry has ambitions to expand

The Canadian apple industry has been working to recoup its position as a significant international player by planting new varieties, improving orchard design for maximum efficiency and investing in state-of-the-art packing and storage facilities. To further increase production, the growers will need to reclaim old orchards or expand into under-utilised farmland.

Taking into account that

there is little to no income during the first five years after planting, the Canadian Horticultural Council's Apple Working Group has prepared a proposal that has the backing of the provincial apple growers' associations in British Columbia, Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. The proposal requests federal government support within an industry rejuvenation program.

Steele, recently re-elected as president of the B.C. Fruit Growers' Association, is advocating for a national tree fruit rejuvenation proposal, having witnessed the success of the replant program in British Columbia. The province's seven-year replant program has been oversubscribed so the provincial government was persuaded to add \$1 million to the program last year, boosting the fund to \$9.4 million. It's expected that at least 1,600 acres will be replanted by 2021.

This provincial success is the template for a national proposal. Rebecca Lee, executive director, Canadian Horticultural Council, explains that renewal and expansion will also bring more efficient infrastructure, thereby reducing the use of resources such as water and energy. Innovative technologies in sorting, grading and postharvest management will help Canadian growers compete globally with the highest quality apples.

NEWSMAKERS

The British Columbia Fruit Growers' Association has re-elected **Fred Steele** as president. Joining him on the 2017 board is vice-president **Pinder Dhaliwal** and directors **Peter Simonsen**, **Ravinder Bains**, **Deep Brar**, **Sukhdev Goraya**, **Surjit Nagra** and **Tony Nijjar**. The association represents 520 family farms.



(L-R): Fred Steele, BCFGAs president; Avatar Bopari; Hon. Norm Letnick, BC Minister of Agriculture at a 2015 announcement of a new Replant Program.

Congratulations to all award winners from the BC Fruit Growers' Association annual general meeting. The awards of merit went to **Hank Markgraf**, grower services manager for BC Tree Fruit Cooperative and **Dr. Kenna MacKenzie**, associate director research, development and technology, Summerland Research and Development Centre. Life membership was awarded to **Ranbir Kambo**, grower and director on the board at Summerland Varieties Corporation. The press award honoured **Lyone Doherty**, editor of the Oliver Chronicle.

Fruit Logistica announced that **Rijk Zwaan** seed company is its Innovation Winner for 2017. The award was presented in Berlin on February 10 for its KNOX breeding technology that delays pinking in fresh-cut lettuce. For more, turn to page 8.



Farm & Food Care Ontario's Board of Directors has announced the departure of executive director, **Tracy Hussey**. The interim replacement is **Kelly Daynard** with more than a decade of employment with the organization, whose mandate is to provide credible information on food and farming.

The horticultural industry is saddened to learn of the loss of **Brenda Lammens**, 61, on February 11, 2017. She and her husband Raymond manage Spearit Farms, an asparagus operation near Langton, Ontario. She was a former chair of the Ontario Fruit and Vegetable Growers' Association (OFVGA). A month before her passing, she was honoured with the OFVGA Industry Award of Merit. (See February issue of The Grower).

Condolences to the family of **Steve Fett**, 59, potato grower near LaSalette, Ontario, who passed February 5. He and his wife Paula operate a Norfolk County farm, providing several varieties of potatoes to a wide range of customers as well as the Ontario Food Terminal.

Long time apple farmer and cider maker, **Grant Howes**, 60, passed away suddenly at his home in Waupoos Ontario on January 21. Grant worked in finance in Toronto before moving out to British Columbia where he was involved in a number of businesses before returning to the family farm in Prince Edward County to pursue his dream of opening a cidery and making the ultimate cider. He was a mentor and friend to others in the cider industry and became recognized as the 'grandfather' of cider in Ontario.

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COVER STORY

Capital flees Ontario to expand greenhouses in the U.S.

Continued from page 1

Our best estimate is that it costs an additional \$6,200 per acre per year for heat, solely due to cap and trade. Growth could stop or even decline."

"We need transition time to look at other technologies," continues Seguin. "Newly expanded operations installed natural gas as the most efficient energy source, but are now being penalized under cap and trade."

What is particularly galling for greenhouse growers is that the Ontario government exports surplus electricity to the U.S. at 0.5 cents per kWh – the same business rates offered in border states.

When Ontario must meet peak heating demands, its natural gas is "interruptible" to greenhouse growers. Seguin explains that growers might be asked to switch to alternative energy supplies a dozen or more times a season. That means growers must install back-up systems such as burning biomass to heat boilers.

Ontario's greenhouse vegetable industry is world-class says Jan VanderHout, a greenhouse grower and chair of the Ontario Fruit and Vegetable Growers' Association.

"The margin for energy improvements is small because we've already installed state-of-the-art technology, whether it's condensers on boilers or energy-saving curtains," he says. "The smaller producers who have introduced these technologies may be producing just under 10,000 tonnes of greenhouse gas emissions per year, the point at which they would be eligible for cap and trade credits. They are

feeling angry because they've done everything to be energy-conscious, but are now penalized because of their size."

One case in point is TG & G Mastronardi Farms with 16 acres of greenhouse tomatoes at Leamington, Ontario. "The smaller growers are hit the hardest," says Gerry Mastronardi. Consider two operations of similar size, he says. One emits just over 10,000 tonnes of carbon dioxide per year and the other emits 9,500 tonnes of carbon dioxide per year. The first operation would pay \$259,000 in cap and trade taxes over six years. The second operation would pay \$1.8 million over the same time span. The dollars siphoned off by cap and trade would normally be earmarked for facility improvements, but are no longer available for investment.

To add insult to injury, Mastronardi has committed to a five-acre expansion with long-term contracts for natural gas until 2020. "I can't back out of these contracts," he says. "There are penalties everywhere, no matter what I do."

In February 2017, the Ontario government announced a \$100 million Natural Gas Grant Program to fund expanded infrastructure in underserviced municipalities. While these funds are welcome at the municipal level, access may not come soon enough for growers. The natural gas pipeline was recently expanded in the Leamington area – where the greenhouse industry is most concentrated – but a survey of growers indicated that business needs were 2.5 times higher than what was provided.

Any promise of more access



It's Ontario. Electricity prices, lack of infrastructure and now cap and trade are making it impossible to make money.

~ BERT MUCCI

to natural gas is tempered by the current reality of 2017 invoices. Red Sun Farms, for example, has already invested south of the border with a 18-acre Virginia facility and is holding its grand opening of a 19-acre Wapakoneta, Ohio facility on March 1. It's the first phase of a greenhouse with tomatoes-on-the-vine and specialties says Harold Paivarinta, business manager, Red Sun Farms. If customers are receptive and business conditions warrant, another 10 acres is planned for Ohio.

"All of these facilities are close to 60 per cent of the American population and provide local product to consumers," says Paivarinta. "The level of technology – automation, lighting, greenhouse heights – make it possible for us to build where we would not have considered

possible 30 years ago."

Toby Barrett, MPP Haldimand-Norfolk and Ontario's official opposition critic for agriculture, is observing the flight of capital with concern. In a recent column, he writes: "The business environment has now further deteriorated with large and unpredictable global adjustment charges on electricity, and the arrival this year of the cap and trade tax."

The global adjustment charge is the amount added on industry bills to cover the above-market rates the government negotiated for industrial wind turbines and solar panels.

Barrett points to the high-profile case of Maple Leaf Foods, Canada's leading retailer of packaged meats and an employer of 5,100 people. During

pre-budget hearings, Maple Leaf revealed that the company's electricity bill increased in 2016 by 18 per cent to \$19.7 million across all of its Ontario plants.

Without relief for the farming sector, investment will migrate south to a sunnier business climate. To stem that flow, the horticultural sector is looking to the Ontario government for time to adapt.

Glen Murray, Ontario's minister of the environment and climate change, tweeted February 11: So many of our vegetables come from drought-stricken California - \$4 billion of imported food could be grown in Ontario. Mike Pasztor, an Ontario cash crop and vegetable grower replied: If only Ontario were an economically viable jurisdiction for business to invest in, this could be a reality."

not subject to the carbon tax. They have been exempted while Ontario growers have not. U.S. and Mexican growers do not have this tax, so clearly we're less competitive."

NatureFresh Farms is currently involved with OGVG to help set policy in Ontario to make wintertime power – much of which would be used off-peak – more affordable to vegetable growers.

On the record



NatureFresh Farms is quite often in the news for all the right reasons. Last month, the business was one of five nominees for the World's Most Inspirational Tomato Grower, an award announced at Fruit Logistica in Berlin, Germany. While Greenco from the Netherlands won, to be in the same circle of other businesses from the United Arab Emirates, Australia and the United Kingdom, is a testament to the

global competitiveness and stature of NatureFresh Farms.

That peer recognition won't buy a Tim Hortons coffee back in Canada.

"Yes, the business climate in Ontario is getting worse," says Peter Quiring, owner and president of NatureFresh Farms. "We are less competitive than our counterpart competitors in other jurisdictions. Alberta and British Columbia growers are

Yes, the business climate in Ontario is getting worse.

~ PETER QUIRING, OWNER & PRESIDENT, NATUREFRESH FARMS, LEAMINGTON, ON

CROSS COUNTRY DIGEST

BRITISH COLUMBIA

Cauli Crumbles line to expand

A family-owned British Columbia food processing business has received funds to expand its Cauli Crumble project. Big Mountain Foods, helmed by president Kimberly Chamberland, is receiving up to \$49,250 in funding through the cost-shared Canada-British Columbia Agri-Innovation Program.

Cauli Crumble is an innovative vegetable ground product that consists of fresh cauliflower, sunflower seeds, fresh red peppers and Manitoba-grown, organic yellow split peas. A meat-free alternative to soy and gluten, Cauli Crumble can be used in many different

dishes including pasta, pizza, tacos, salads and casseroles.

The local cauliflower and red peppers come from a vegetable processor, Freshpoint, in Richmond, BC which has equipment to make a consistent ¼ inch cut, explains Chamberland.

Last summer, a series of demos at community events and barbeques raised awareness of the product. Chamberland says the target market ranges from seniors to busy parents who want convenient products for their children. The product is now in more than a thousand retail stores, mostly in the province of British Columbia.



Kimberly Chamberland, Big Mountain Foods.

MANITOBA

Potato industry looks to settling 2017 contracts

Until Washington state potato growers finalize contracts with Lamb-Weston, it's a

waiting game for the rest of the continent. At press time, Manitoba growers had started

preliminary talks with Simplot and McCain said Dan Sawatzky, general manager of the Keystone Potato Producers' Association, based in Portage la Prairie.

"Our plants are currently running at capacity," said Sawatzky. "We had a big crop last year so the volumes may be down slightly this year."

Of Manitoba's 65,000 potato acres, about 45,000 acres are destined for processing. "We are the largest processing province in the country," notes Sawatzky, "but that may change with the expansion of Cavendish Farms in Alberta."

The Cavendish frozen potato processing plant, announced for a summer 2019 opening in Lethbridge, is expected to require another 9,000 acres of potato production. While two provinces away to the east, Manitoba growers think there may be an opportunity to supply potatoes in short-crop



years.

Yields are moving upwards with a trend towards tighter row spacings. In recent years, growers have moved from 38- or 36-inch row spacing to 34 inches. The earlier row closure is beneficial in beating heat stress, however there may be a

tradeoff in more foliar diseases.

Growers considered all the production angles at the end-of-January Manitoba Potato Production Days. If attendance is any indicator -- 535 growers and industry representatives plus 80 exhibitors -- the industry is optimistic.

ONTARIO

Hazelnut update

The Ontario Hazelnut Association is holding its 8th annual symposium on March 28 in Brantford. Andrew Nixon, OHA project coordinator, says this event will host results of the first growing season of a trial program with six growers planting 10 acres of high-density hazelnuts. These are the first commercial-scale plantings in Ontario.

Hazelnut processor, Ferrero, has a goal of reaching 23,000 acres planting in Ontario by 2023. "We have renewed our memorandum of understanding with Ferrero and will lay out our roadmap to reach this goal,"

says Nixon.

Ferrero's new CEO Fabrizio Secco will be in attendance.

Keynote speech is titled

"Establishing a nut farmers' cooperative" by Greg Miller, Empire Chestnut Co and Route 9 Chestnut Cooperative.



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CROSS COUNTRY DIGEST

QUEBEC

QPMA is promoting fruit from Chile

The Quebec Produce Marketing Association (QPMA), in partnership with the Chilean Fresh Fruit Association (CFFA), is pleased to present Coup de coeur pour les fruits du Chili, a new food guide featuring blueberries, grapes, plums, peaches, and nectarines . . . flavour-filled gems from the farms and orchards of Chile.

Julie DesGroseilliers, nutritionist and spokesperson for the "I Love" campaign, introduces this exciting range of products

from Chile, our leading imported source of fruit from the Southern Hemisphere. Because it's summer in Chile when it's winter in Quebec, many products from Chile appear in our grocery stores during the coldest months of the year. "It's a real blessing for us," says Julie. "Let's make the most of it and put lots of variety, colour, and great eating on our daily menus." The Coup de coeur food guide for Chile makes it easy for everyone discover the benefits of these

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market place with tools in this catalogue to inspire and educate retailers, schools, dieticians and health service representatives."

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PRINCE EDWARD ISLAND

Potato growers work to increase processing yields

“

The initial three-year goal is to improve marketable yield by 25 cwt per acre on processing varieties.

~ RYAN BARRETT

”

Since May 2016, the Agronomy Initiative for Marketable Yield Improvement (AIM) has been active to improve yields while prioritizing grower profitability and environmental sustainability. Ryan Barrett, project lead for the PEI Potato Board, reports that the partnership consists of Cavendish Farms, province of PEI, Agriculture and Agri-Food Canada. Each has a representative on the steering committee and three working groups. The initial three-year goal is to improve marketable yield by 25 cwt per acre on processing varieties.

Following grower consultations, the working groups have been active in identifying key areas where projects can be developed to provide growers with the right information to improve production practices.

For the Seed Management Working Group, investigation of the use of whole seed was identified as a high priority. A first year of research to compare whole versus cut seed under PEI growing conditions was completed. An expansion of that project is planned for 2017. A series of workshops on improvements to seed handling is planned for early April 2017, and field trials looking at the effect of seed generation on marketable yield is also planned.

The Soil Improvement Working Group has identified crop rotation and building soil organic matter as high priority areas. A series of local work-

shops on building soil health through crop rotation featured Dr. Robert Larkin from USDA in Maine. In addition, a demonstration trial featuring different soil-building rotation crops will be established at Harrington Farm, with plans for an open house this summer. The Soil Working Group is also working on projects in the areas of soil compaction, early drying complex and the economic analysis of different crop rotations.

The Science and Technology Working Group has perhaps the broadest range of potential project areas to explore. One of the high priority areas is to investigate making use of grower grade-slip data to provide a benchmarking tool for growers directly, as well as identifying trends and correlations within the data that can be further investigated. It is thought that there is significant value in this database at the PEI Potato Board that the industry is not capitalizing on.

In addition, two projects are planned relating to precision tools. On March 13-14, a series of local workshops will be held to explore the power of new precision tools to better measure yields and soil variability. As well, a research project examining soil electroconductivity and its use in variable fertilizer rate and lime application is also being explored. This group is also actively looking at different types of potato equipment/technology directly with growers.

Further information is available from the chairs of the working groups: John Ramsay (seed); Jonathan MacLennan (soil); Nathan Ching (science/technology).

Source: Prince Edward Island Potato News January/February 2017

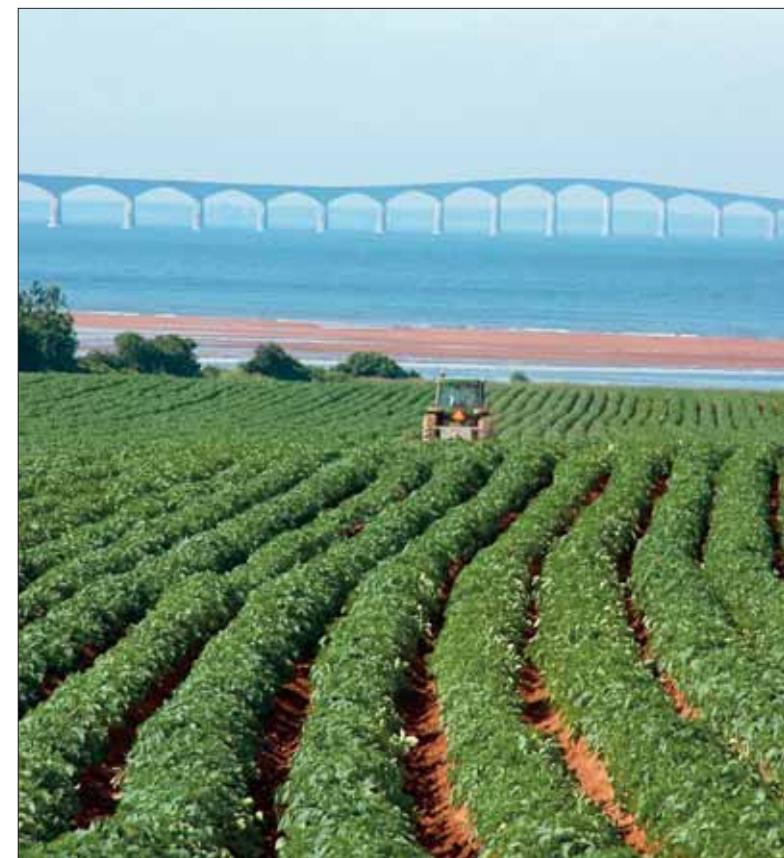


Photo courtesy Prince Edward Island Potato Board.



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INTERNATIONAL

Fruit Logistica announces 2017 innovation winners



1

One of the most highly anticipated announcements at the Fruit Logistica February 8 - 10, 2017 trade show was that of innovation winner. The coveted award was chosen by more than 75,000 trade visitors from more than 130 countries who attended the fresh produce exhibition in Berlin, Germany.

Out of 10 nominations, Rijk Zwaan seed company won the

coveted award for its genetic trait KNOX which delays pinking in fresh-cut lettuce. Oxidation at the edges of a fresh cut lettuce, the natural wound reaction of trimmed cells, manifests itself as a pink-brown discolouration. This unattractive colouring leads to rejection by consumers and increased waste of products which are otherwise qualitatively unimpaired. KNOX delays

the pinking and thus prolongs the shelf life of cut lettuce by one to two days. The lettuce does not necessarily require low-oxygen packaging. Cos was the first variety with this new feature. Other varieties include Iceberg, Batavia, Butter, Salanova Crispy and Salanova Butter. For a video, go to: <https://www.rijkzwaan.com/solutions/knox>

The second-place winner was The Cracking Monkey Pili Nuts from the German firm, Die Frischebox. Pili nuts come from the Philippines. Osmotic pre-germination increases the nutritional value and levels of vitamin E are several times higher than those of other nuts. Using a unique patented method, The Cracking Monkey – Pili Nuts are pre-scored for easy opening and sold with a special stainless steel cracker tool made of recycled cutlery. The nuts are sold in environmentally friendly cotton bags printed with soya-based inks. Frischebox thus guarantees a product which is completely environmentally friendly.

The third-place winner was Natupol Excel – Bumble Bee Vision from Koppert Biological Systems from the Netherlands. Bumblebees have orientation problems when daylight is reduced by factors such as the use of artificial light during the darkest months of the year or extra layers of poly covers. The 'bee vision' features on Natupol Excel hives are designed to help bumblebees navigate in these and other unfavourable conditions. Natupol Excel, a European premiere at Fruit Logistica 2017, is specifically developed for crops with a high number of blossoming flowers, including cherry tomatoes and (straw)berries and can be used in illuminated greenhouses. Strategically placed reflective cues on the boxes and additional colour cues around the hive entry improve visibility. This



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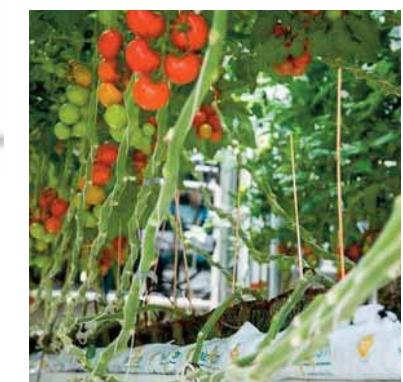
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"Streamer Automatic Spiralizer," Turati srl, Italy

A spiral cutting machine for the high volume handling of vegetables to produce pasta-like shapes such as spaghetti, tagliatelle, rings and even gnocchi-like cores.

"Sustainable Grow Bag for Tasty Tomatoes," Greenyard Horticulture Belgium, Belgium



A fully compostable growbag filled with 100% organic substrate for the cultivation of greenhouse vegetables such as tomatoes and other products.

"Yello – The Color of Taste," VI.P/VOG, Italy



A sweet and crunchy yellow apple variety of Shinano Gold, a Japanese cross between Golden Delicious and Senshu.

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INTERNATIONAL

UNITED STATES

Pushing blueberries year-round

The U.S. Highbush Blueberry Council is winding up a Winter Fresh, Summer Somewhere campaign, targeting millennials. Research has shown that consumers believe blueberries are in season only in May through August, however, the antioxidant-rich fruit is available year-round with supplies from South America.

For more information on the Blueberry Council's research and promotion efforts, visit littlebluedynamics.com and ridethebluewave.com.

Source: FreshPlaza.com



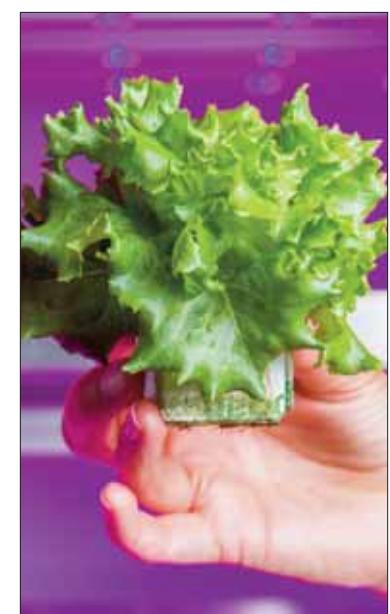
NETHERLANDS

Vertical farming up, up and away

Philips Lighting, a global leader in lighting, has announced that Staay Food Group, a leading fresh fruit and vegetables company, is building the first of its kind vertical farm in Europe, in Dronten, the Netherlands, using Philips GreenPower LED horticultural lighting. The facility will serve one of Europe's biggest supermarket chains and be used for testing, and optimizing processes for future, larger vertical farms.

Staay, Philips Lighting and vegetable breeder Rijk Zwaan collaborated during the past three years to determine the best combination of lettuce varieties and growth recipes in order to improve crop quality and yields.

Source: Fruit Logistica



CHINA

Trends revealed at Potato Expo

The world outlook for frozen potatoes is very positive reported Steve Patterson, global vice-president for J.R. Simplot Company. He says 80 per cent of food service sales are now outside the U.S. The largest food service market is now China. Projected global growth from 2015 to 2020 is expected to increase by 2.5 billion pounds. McDonald's all-day breakfast was the headline of 2016, generating high usage of potatoes.

Source: PEI Potato News

NEW ZEALAND

Dazzled by new apple variety



The 20-year breeding process for Dazzle apple is expected to be an overnight success, much like Royal Gala was decades ago.

The large, red, sweet apple was bred conventionally, through crossbreeding "Sweetie" and "Scired." Its sweet profile is aimed at the Chinese market. More than 100,000 trees are already in New Zealand orchards.

Fruitcraft – a collaboration of Mr. Apple, Bostock New Zealand and Freshmax -- has launched the new apple variety, with global licensing rights by Prevar Ltd. The company is forecasting one million cartons of the Dazzle apple to be exported by 2028.

Source: FreshPlaza.com

CONSTANTLY RAISING THE BAR



IFSI

American Dream is a high quality bi-color variety from IFSI, who is known for bringing varieties with outstanding eating quality.



VOLOAGRI

Cobra is a productive hybrid with an excellent disease package from US Agriseeds, a leading provider of top pepper, tomato, and cucumber varieties.



Enza Zaden

Frederik produces high quality fruit with long shelf life. This greenhouse variety is the latest addition to Enza Zaden's protected culture line.

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GRAPE INDUSTRY

Brock researchers examine impact of preharvest frost on red wines

When Niagara vineyards were hit by an early frost during the 2015 harvest, winemaker Emily Aubie and her colleagues were puzzled by the impact the frost was having on their wines.

What Aubie and other Ontario winemakers were noticing was that when Cabernet sauvignon and Cabernet franc were machine-harvested after a frost, the wines had an unfavourable floral/green aroma and taste, decreased colour intensity and a bitter taste that lingered on the palate.

Frosted leaves and petioles—referred to as materials other

than grapes (MOG)—that weren't present when the grapes were hand-picked were thought to be impacting the wine fermentations.

With no concrete answer, the problem was brought to scientist Andrew Reynolds at Brock University's Cool Climate Oenology and Viticulture Institute. Reynolds invited Aubie to return to Brock, where she completed a Certificate in Grape and Wine Technology, to get to the bottom of what was happening based her winemaking knowledge and PhD in chemistry.

"The goal is to help improve the quality of wines in Niagara," Aubie said. "However, this work could have a global impact in the face of climate change when regions who don't typically have frost exposure during the growing season encounter an early frost."

They started by gathering samples of impacted wines from two commercial wineries for analysis, while planning a research trial during the 2016 harvest. Preliminary chemical analysis on the commercial wines has showed elevated levels of the unfavourable floral



Materials other than grapes (MOG). Photo by Glenn Lowson.

compounds. Next, Aubie will look to a sensory panel to see if these compounds are present at a level that can be detected by consumers.

To understand what compounds are impacting the fermentation, a trial examining the impact of frosted leaves and petioles—the stalk that joins the leaf to a stem—is also underway.

"Traditionally people have been more concerned about the addition of petioles," Aubie said. "But no one has ever looked at the impact of increased leaves after frost."

The control wine in the trial has no MOG added, and then the trials either add four increasing amounts of frosted petioles into the wine, or four increasing amounts of frosted leaves. This will allow the researchers to see how each MOG is independently impacting the wine.

Reynolds noted that during the past few vintages, growers are letting grapes hang longer on the vine to mature longer,

which could increasingly bring them head-to-head with frost.

"As a researcher it's always exciting to be looking at something that hasn't been examined before," Reynolds said.

Understanding the impact of the frost will allow the researchers to provide the industry with best practice guidelines and details on managing the unfavourable characteristics.

Aubie and Reynolds are looking to secure funding to continue this work. Next they'll examine how the unfavourable characteristics are impacted by alcohol and heat extraction; the amount of time grapes and MOG are soaked prior to ferment; and the impact different yeast strains have.

This project is funded by Ontario Grape and Wine Research Inc. and through in-kind support from Andrew Peller Ltd. and Diam.

Source: CCOVI news release.

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GRAPE INDUSTRY

Brock's grape and wine lectures are food for thought

A decade ago, a series of lectures began in 2007 as a way to get timely research out of the lab and into the hands of Ontario grape growers and winemakers.

Today the annual lecture series by Brock University's Cool Climate Oenology and Viticulture Institute (CCOVI) has a global reach. Since tracking began in 2012, the presentations by leading scientists and industry experts have had more than 7,000 views from 43 countries worldwide.

It all starts up again this winter as the 2017 series of weekly lectures takes place on Wednesday.

"The series started as a way to get our research out to the growers and winemakers in our own backyard," said CCOVI director Debbie Inglis. "Taking the series online has been a real game-changer allowing us to share our industry-driven research across Canada and around the world."

Topics for this year's series span the grape and wine value chain examining areas from sparkling wine production, to the effect wine ratings have on prices, and how climate change is impacting Ontario's wine industry. The series will also bring in two Agriculture and Agri-Food Canada researchers from British Columbia to share their latest findings.

The free lectures start at 2 p.m. Wednesday's, except for Friday Feb. 24, and will take place in room H313 of the

Mackenzie Chown complex at Brock University.

To watch the live webcasts or archived videos, go to brocku.ca/ccovi

Lineup and dates for the 2017 CCOVI Lecture Series:

- Feb. 15: Belinda Kemp, CCOVI Oenologist, Brock University
"A comparison of clones from Champagne and Burgundy grown in Ontario for sparkling wine production"
- Feb. 24, 10 a.m.: Kevin Usher, Research Scientist, Agriculture and Agri-Food Canada
"The effects of pre-bloom, fruit set and veraison leaf removal on yield, composition and wine quality in the Okanagan Valley"
- March 1: Wendy McFadden-Smith, Tender Fruit and Grape IPM Specialist, Ontario Ministry of Agriculture, Food and Rural Affairs "Sour rotted grapes: Managing your preharvest breakdown"
- March 8: Don Cyr and Lester Kwong Professor of Finance, Operations and Information Systems and Associate Professor of Economics, Brock University
"The application of copula function modelling to Bordeaux en primeur wine ratings"
- March 15: Tony Shaw, Professor of



Jim Willwerth, Brock University, is sampling vines for cold hardiness.
Photo courtesy of CCOVI.

Geography, Brock University "Climate change and the evolution of Canada's wine appellations and emerging areas: Challenges and benefits"

- March 22: Jim Willwerth, CCOVI Viticulturist, Brock University "The potential impact of climate change on grapevine dormancy and cold hardiness"
- April 5: Gary Pickering, Professor of Biological Sciences, Brock University "Proselytizing pyrazines: How to avoid and remediate greeness in

wine"

- April 12: Andrew Reynolds, Professor of Biological Sciences, Brock University "Opportunities for remote sensing by unmanned aerial vehicles to map variability in Ontario vineyards"

- April 26: Tom Lowery, Research Scientist, Agriculture and Agri-Food Canada "Epidemiology and management of grapevine virus diseases"

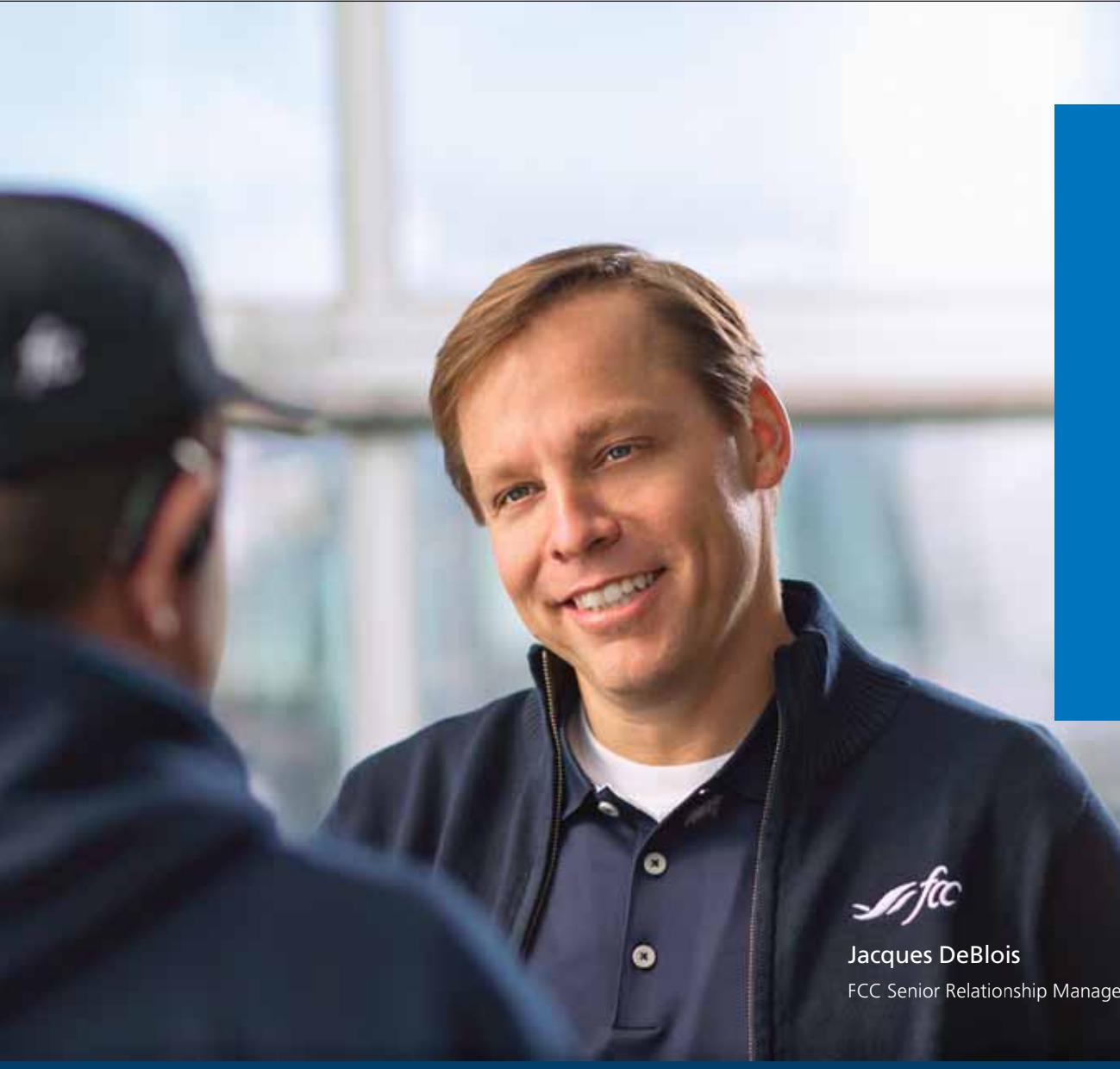
Source: Brock University news release

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The impact of Cap and Trade



JAN VANDERHOUT
CHAIR, OFVGA

Cap and Trade is now upon us in Ontario and we, to varying degrees, have felt at least some of its impacts. If and how Cap and Trade has impacted our behaviour is another matter. Will we go for fewer trips in our cars, turn down the thermostat in our homes and offices, and find ways to be more fuel efficient in our businesses? It is my understanding that the provincial government intends to curb the impacts of carbon emissions on climate change by incentivising the reduction of fossil fuel usage, the sequestration of carbon out of the atmosphere, and the installation of more carbon neutral sources of energy such

as solar, wind, geothermal, and electricity. Our government is striving to be leaders in the war on climate change and wants us to join the ranks in this fight.

As agricultural producers we are constantly on the lookout for ways to increase our productivity and efficiency. In this pursuit of productivity, we are continually asking ourselves production-optimising questions. How do we produce more with less so we can reduce prices? How can we add organic matter, which is essentially carbon, to the soil to improve soil quality and increase production? How can we be good stewards of the land and still earn a profit?

Even though our intentions are good, how can we remain economically competitive and decrease our carbon output when the very money we would use to pay for innovation and carbon-reducing technologies is being stripped away in the form of Cap and Trade? This is a huge issue for greenhouse growers especially since fuel is typically the biggest expense after labour. In fact, Cap and Trade has doubled the delivery charges for natural gas causing a financial strain on growers and hurting their competitiveness.

To compound the problem there is no opportunity to recoup this additional cost from the consumer as we compete with other provinces, states, and countries that do not have this financial challenge. To make matters worse, some of the largest farms that are emitting more than 10,000 tonnes of carbon per year are allowed to opt into Cap and Trade and accordingly claim "free credits" and pay a relatively small fraction of Cap and Trade compared to their smaller counterparts. In effect, Cap and Trade has created an un-level playing field even between neighbours with a significant advantage going to the biggest farms. A greater injustice is experienced by growers who are not able to opt in because they have installed energy-saving technologies in recent years and are subsequently emitting less than 10,000 tonnes of carbon per year. In essence they are being penalized for doing a good job. Something needs to change.

The Ontario Greenhouse Alliance has been talking to government for almost two years about this and so far have not been able to come up with any workable solutions. Our

government is intent on keeping Cap and Trade in place and our federal government is requiring that all provinces must have carbon pricing in place in the near future. This is the new reality in the battle against climate change. Discussions with the appropriate ministries are ongoing with the collective hope that we can find some leeway for growers to adapt to the new situation while continuing to do our part to curb climate change.

I believe that the only possible solution is to get a rebate for our contribution to Cap and Trade on agricultural fuels including natural gas, propane and dyed diesel. We are being told "no" to this request but the request needs to stay on the table. I hope that like British Columbia and Alberta we can arrive at some agreement on a rebate for farmers who are doing the right things to conserve fuel even if they were early adopters.

It is my hope that when we are using fuel effectively in the business of agriculture we will be rewarded for that.

Ontario farmers are responsible users of resources and should not be penalized by Cap and Trade when they are

already leaders in environmental performance and in most cases are not able to increase prices on their perishable and internationally traded products.

At the time of writing there is another meeting scheduled between greenhouse leaders and Minister Glen Murray (MOECC). Hopefully this meeting will lead to some opportunities to keep Ontario growers competitive in a global marketplace. I am sure that Minister Murray is keen on a bountiful agricultural sector in the province as he feels strongly that Ontario is poised to feed more hungry mouths when other jurisdictions are challenged by climate change. It will be interesting to see if the request for aggregation will be accepted, allowing growers to collectively claim free allowances like their larger counterparts. Maybe a model can be established that will give credit for carbon reducing measures that have already been implemented. It is my desire that we find a way to meet growers economic needs as we reduce our carbon output, increase carbon sequestration, and remain competitive in a global marketplace.

WEATHER VANE



These workers are pruning tomato plants at NatureFresh Farms, Leamington, Ontario. Photo by Glenn Lowson.

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THE GROWER

PERSPECTIVE



Canadian food starts with small business



**OWEN ROBERTS
U OF GUELPH**

Even though it goes on ceaselessly, the pursuit of defining Canadian food usually comes to one conclusion, at least for Canadian food guru Anita Stewart: Canadian food is regional. Some commodities or ingredients grow coast to coast to coast; but overwhelmingly, the variety of produce from farms in this country has a richness, depth and regionalism that defies sameness.

Stewart ought to know. Her popular pan-Canadian coffee table book about food from this

country, the Flavours of Canada, wasn't called the Flavour of Canada . . . although I suppose the latter would work too. The flavour of Canada is diversity.

Anyway, earlier this month, Stewart offered some of her colourful perspectives on Canadian food as part of a public lecture series commemorating our country's 150th anniversary, at the Guelph Civic Museum. The presentation was loaded with photos of such tantalizing treats as butter tarts, fresh fish and sushi.

Listening to her, it struck me that much of our innovative food diversity comes from home kitchens and restaurant chefs. Sometimes it's the mother of necessity, sometimes it's the mother of bounty, sometimes it's the mother of curiosity.

But once researchers and farmers apply their special touch to developing new varieties of fruit, vegetables and row crops, and growing them, or improving livestock and raising

them, it's someone else's turn to make them into edible products.

Sometimes, that's a job for processors. Their contributions to making Canadian food products widely available cannot be understated. Their investment in processing technology and know-how is pivotal for turning raw commodities into edible food.

Then there's chefs or homeowners in small kitchens — much like the one in Stewart's house in Elora, where her own recipes began, and went on to become a slice of Canadians.

But as a budding entrepreneur with an innovative, killer homemade product, how do you go from the stove top or oven to the store front?

It's an important question. Small business is the engine of the economy. And in the U.S., for example, small food companies are growing at a rate of 11-15 per cent a year, 10 times the speed of top manufacturers.

A couple of programs are on

the horizon to help people get started. Food business consultant and dietitian Jane Dummer is leading an Innovation Guelph workshop in the near future on starting a small food business. Elsewhere in Ontario, the province is offering a course called Selling Food to Ontario, which runs in March.

It will cover topics such as market channel opportunities, basics of food regulations, costing and pricing your products, food packaging and labelling, getting your product listed, and food trends.

Dummer cites several reasons why small food companies are catching on.

First, she says, small companies are "agile." They can spring up faster and respond more quickly to consumer trends. When some new imperative comes along, then can make change much faster than big business.

They also attract consumer loyalty. Consumers can identify with the person behind the

product. And in an age of faceless corporatism, that counts.

Millennials in particular like what are called "mission-based companies," those committed to such measures as high animal welfare standards and environmental sustainability.

To me, that has farming written all over it. Farmers share these values. They care for their animals and they care for the environment.

Plus, farmers are already businesspeople. They understand business principles, like how profitability and sustainability go hand in hand. And when it comes to food, it all starts with them.

Dummer is enthused about small business possibilities for farmers with a particularly entrepreneurial spirit and the willingness to do something different.

"Agricultural products from Canada have always been highly regarded, at home and around the world," she says. "There are some real opportunities out there."

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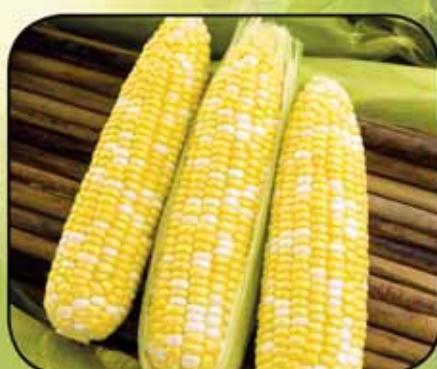
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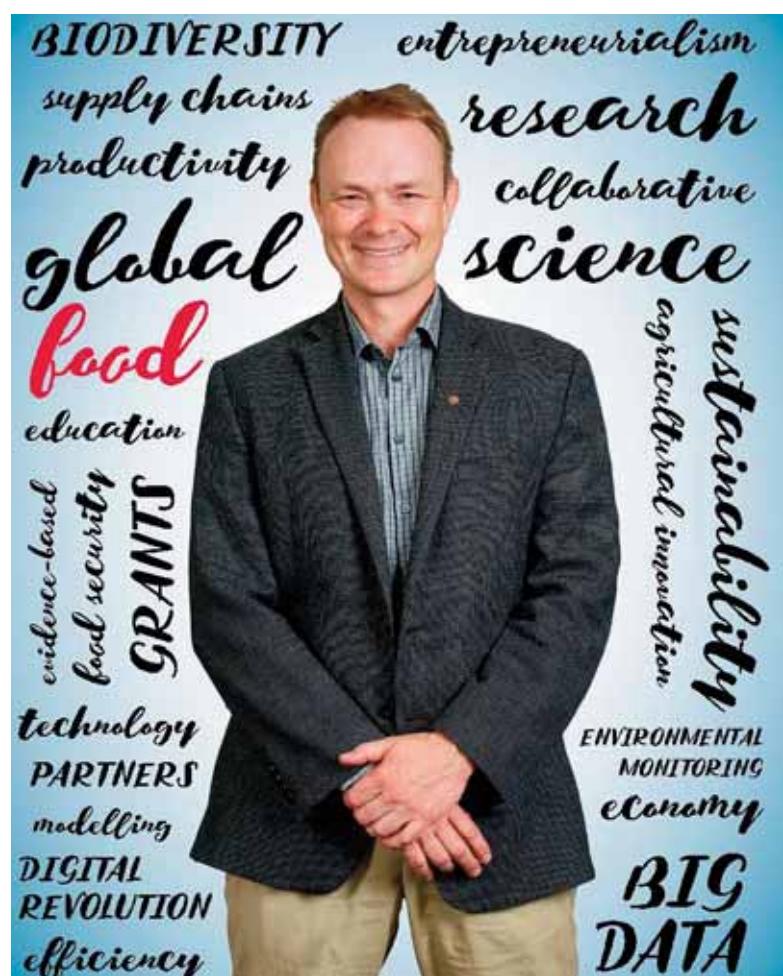
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THE GROWER



Heads-up on Farm & Food Care Annual Conference and Speakers' Program



Dr. Evan Fraser, University of Guelph

Join Farm & Food Care Ontario for its annual conference and speakers' program on Thursday, April 13 at the Royal Botanical Gardens in Burlington.

Highlights include:

- Is Gwyneth Paltrow wrong about everything? Keynote address by Professor Timothy Caulfield, Faculty of Law and the School of Public Health, University of Alberta
- The politics of food: Dr. Evan Fraser, University of Guelph
- Ask the millennials: A consumer panel discussion on issues related to food and farming, as seen through the perspective of university student leaders. Moderated by Andrew Campbell, Fresh Air Farmer.
- Hitch pins: Connecting and Sharing your Values: Laura Daniels, Founder and President of the Dairy Girl Network, Wisconsin.

The day will also feature highlights of Farm & Food Care's 2016 activities, presentation of the Annual Champion Award, a "Taste of Ontario" lunch and more.

Tickets are \$100 for Ontario farmers; \$150 for industry/academia and government if purchased before March 15. The deadline increases to \$200 after that date.

Farm & Food Care Ontario's annual business meeting for members will take place the afternoon preceding the conference.

To register or learn more about either event, visit www.FarmFoodCareON.org

COMING EVENTS 2017

March 1-2	Association of Independent Corrugated Converters Conference and Table Top Show, Mississauga Convention Centre, Mississauga, ON
March 2	Ontario Processing Vegetable Growers 41st Annual Tomato Day, Countryview Golf Course, Dover Centre, ON
March 2	Asparagus Farmers of Ontario Grower Information Day, German Hall, Delhi, ON
March 3	Foreign Agricultural Resource Management Services (FARMS) Annual General Meeting, German Hall, Delhi, ON
March 9	Ontario Fresh Grape Growers' Marketing Board Annual General Meeting, Board Office, St. Catharines, ON
Mar 12-18	Ag Safety Week, www.agssafetyweek.ca
Mar 14-16	Canadian Horticultural Council Annual General Meeting, Fairmont Winnipeg, Winnipeg, MB
Mar 15-16	Northeast Potato Technology Forum, Crowne Plaza Hotel, Fredericton, NB
Mar 21-23	National Minor Use Priority Setting Meeting, Hotel Lac Leamy, Gatineau, QC
March 24	29th Annual Cuvee Grand Tasting, Scotiabank Convention Centre, Niagara Falls, ON
March 28	District 3 & 4, Ontario Tender Fruit Growers' Annual General Meeting, Colasanti's Tropical Garden, Kingsville, ON
March 28	Wireworm Research and Extension Seminar, Red Shores Racetrack, Charlottetown, PE
March 28	8th Annual Ontario Hazelnut Symposium, Best Western Hotel, Brantford, ON
March 29	District 5, Ontario Tender Fruit Growers' Annual General Meeting, The Blue Elephant, Simcoe, ON
March 30	District 1 & 2, Ontario Tender Fruit Growers' Annual General Meeting, Hernder Estate Winery, St. Catharines, ON
April 12-13	Muck Vegetable Growers' Annual Conference and Trade Show, Bradford and District Memorial Community Centre, Bradford, ON
April 12	Farm and Food Care Ontario Annual General Meeting, Hilton Garden Inn, Burlington, ON
April 13	Farm and Food Care Ontario Annual Conference and Speakers' Program, "Myths and Food Fantasies: The search for easy answers can be hard to digest," Royal Botanical Gardens, Burlington, ON
May 9 – 11	Canadian Produce Marketing Association 92nd Annual Convention and Trade Show, Toronto, ON
May 31	Food and Beverage Ontario Annual Conference, Steam Whistle Brewery, Toronto, ON
June 4-8	International Organization of Biological Control Meeting (Western Palearctic Region), Niagara Falls, ON
June 11	Ontario Agricultural Hall of Fame Induction Ceremony, Country Heritage Park, Milton, ON
June 13-15	United Fresh 2017, West Hall, McCormick Place Convention Center, Chicago, IL
July 5	Ontario Apple Growers Summer Tour, Niagara, ON
July 17-18	BC Wine Grape Council 18th Annual Enology and Viticulture Conference and Trade Show, Penticton Trade Show and Convention Centre, Penticton, BC

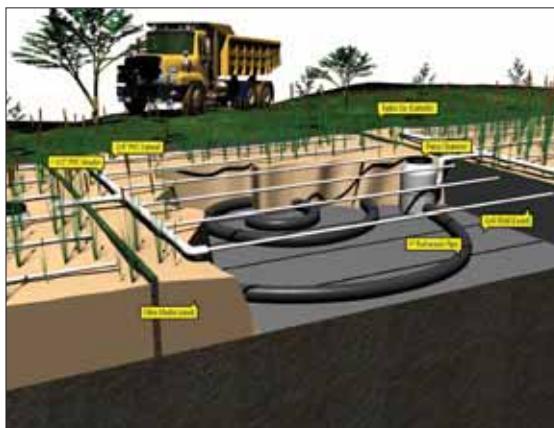
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The AWS has been approved for use by the Ontario Ministry of Environment through over 40 Environmental Compliance Approvals. Recently the Region of Niagara began approving the AWS for treatment of 'small flow' winery washwater i.e. < 10,000 liters per day. Other agencies who have issued approvals include Health Canada, USEPA and OMAFRA. Recent projects include:
 1) treatment & re-use of greenhouse irrigation leach water at greenhouses in Niagara & Haldimand
 2) treatment of winery wastewater at Greenlane Estates Winery & numerous other in Niagara
 3) treatment of landfill leachate at sites in Pembroke, Niagara and Alabama

For additional information please contact Lloyd Rozema at 905-327-4571 or email lrozema@aqua-tt.com



RETAIL NAVIGATOR

Call discounting whatever you want, it's a lower price



PETER CHAPMAN

Discounting prices in the food industry is part of the game. We have trained consumers to look for reduced prices every week. Retailers use this tactic to drive traffic into stores and it can come at the expense of a brand's reputation and the supplier's cost of goods. What does it really cost you?

There are many terms out there for lowering the price. Walmart calls them roll backs, Sobeys does a buy-one, get one-free sale, Loblaw runs Big Brand ads and they even have a sign at the entrance to the store highlighting many forms of discount such as in-store specials, multi-saver items and limited time offers. Regardless of the disguise, they always involve a lower price. The strategy is to bring consumers in with these deals and sell them more at full margin to offset the cost of the discounting.

Consider the true cost of discounting

It is easy to get caught up in the emotion of discounts and the potential volume they can deliver. It is true that a great product in the hands of a new consumer can lead to repeat purchases in the future. It is also true this price-conscious consumer will likely switch again next time a different item is reduced.

Before you agree to reduce your selling price make sure you understand the true impact to your business. It always takes more to get your profit back to the level you need. Consider the example in table 1.

If you discount your price by

15 per cent, your profit per unit decreases to 10 cents/unit. Now you need to sell 2.5 times the volume or 2,500 units to generate the same amount of profit that you would in a regular week, at regular price.

In other words, a 15 per cent reduction in your selling price needs a 250 per cent increase in sales to generate equal profit. Is it realistic to expect to sell 2.5 times more product at this lower price? Every item has a different x factor that we discussed last month, so make sure you know yours.

It is true a volume increase can result in better efficiency and a lower product cost per unit. If you can improve your product cost and reduce it to .72 per unit then you need to sell 1,923 units to deliver \$250 in profit. Now you only need a 92 per cent increase in sales to generate the profit you did at regular price.

The sales lift required to generate the same profit increases exponentially relative to the level of discount. It is too easy to get caught up in the game of lowering prices without understanding the impact on profit.

Make it up somewhere else When I was writing ads for Loblaw we had to make these decisions every week. The issue is the same for your customers, the retailers. They have a category margin to deliver and when they discount an item, it will impact their category margin. Lower prices from suppliers offset some of this but often the level of discount is higher. Sometimes we would get caught up in the "make it up somewhere else" conversation. Reality is that it is tougher than you think!

For suppliers consider the example in table 2.

Let's assume you offer the 15 per cent discount and your selling price changes to .85. It is also realistic that you get some efficiencies and your product cost changes to .73 on this item. Your cents per unit profit has decreased to 12 cents. Volume will increase by 70 per cent and you will earn a profit of \$204. This is \$46 less than your normal weekly profit.

THE GROWER

Table 1

	Normal Price	15% Discount	To maintain profit
Your Cost	\$0.75	\$0.75	\$0.75
Regular Selling Price	\$1.00	\$0.85	\$0.85
Regular Weekly Volume	1,000 units	1,000 units	2,500 units
Weekly Profit	\$250.00	\$100.00	\$250.00

Table 2

	Normal Sale	15% Discount
Product Cost	\$0.75	\$0.73
Regular Selling Price	\$1.00	\$0.85
Regular Weekly Volume	1,000 units	1,700 units
Weekly Profit	\$250.00	\$204.00
Average company return	5%	

To make up the difference in profit with a rate of return of five per cent you will need a sales increase of \$920.00 on another item just to get your profit back to a regular week. How will you generate that without another discount? Discounting prices is a reality so you need to account for it in your product costing. Plan for the appropriate level of discount and don't get caught up in the hype of just more volume. Work through the numbers to understand the impact on your business. Reducing the level of discount slightly will have a big impact on your bottom line. If you have any questions about discounts please give me a call at (902) 489-2900 or send me an email at pchapman@gpsbusiness.ca.

WHAT'S IN STORE

You can talk to consumers

Your packaging is an opportunity to talk to consumers. Often we get preoccupied with the government regulations of packaging and when we are done with the brand and the regulations there isn't room for much else.

These are examples of grabbing the consumer's attention and starting a conversation. Help them understand what to do with your product and don't assume they know. One is more obvious than the other here!

More organic than ever in Europe



I was fortunate to have the opportunity to travel to Europe recently. I was impressed with the selection of organic in stores, throughout the stores. In UK stores such as Waitrose and Tesco, they merchandise the organic with the conventional and specialty stores like Planet Organic are 100% organic. Impressive selection across a lot of categories.

Peter Chapman is a retail consultant, professional speaker and the author of *A la Cart-A suppliers' guide to retailer's priorities*. Peter is based in Halifax N.S. where he is the principal at GPS Business Solutions and a partner in SKUfood.com, an on line resource for food producers. Peter works with producers and processors to help them navigate through the retail environment with the ultimate goal to get more of their items in the shopping cart.
pchapman@gpsbusiness.ca

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Newer strawberry varieties

PAM FISHER

A plot of newer strawberry varieties was established at the Simcoe Research Station in 2014. Plants were established in sandy loam soil, unreplicated plots, in a matted row system and irrigated with sprinklers. Although plots were harvested in 2015, yields were not typical because a severe frost during bloom significantly affected early varieties.

Plots were harvested again in 2016. Harvest data was collected from 2-m plots with consistent plant stand and vigour. Total yield (per 2 m plot) and average berry size from the 2016 harvest is shown in the graphs below. Remember these are unreplicated observation plots, and so data cannot be analyzed statistically.

We also had the chance to make observations on fruit quality and flavour. Here are some observations on some of the newer varieties.

• **Clancy**, developed in New York, was earlier than we expected. Most fruit was harvested in the early-mid season window. Fruit was large with

good quality, very firm texture, and good flavour.

- **Donna**, a newer variety from Spain, did not do well in our trials. Fruit was firm, and red straight through, but with a pasty texture. In our plots, it ripened unevenly, bruised easily, and was sensitive to foliar diseases.

- **L'Authentique Orleans** was developed some time ago in Quebec. It is a productive solid-yielding variety with good flavour, firm fruit and consistent shape. Harvest begins mid-season and extends into the late season. If you have never tried it, Orleans is worth a trial.

- **Laurel** is a productive mid-season variety from Nova Scotia. It has good size and flavour for pick-your-own but a bit too soft for shipping. We noticed that some berries had a hollow center. Although tolerant to root and leaf diseases, it is susceptible to botrytis.

- **Lila** is also a mid-season variety from Nova Scotia. Earlier than Laurel, it was a favourite with our pickers for good quality and flavour.

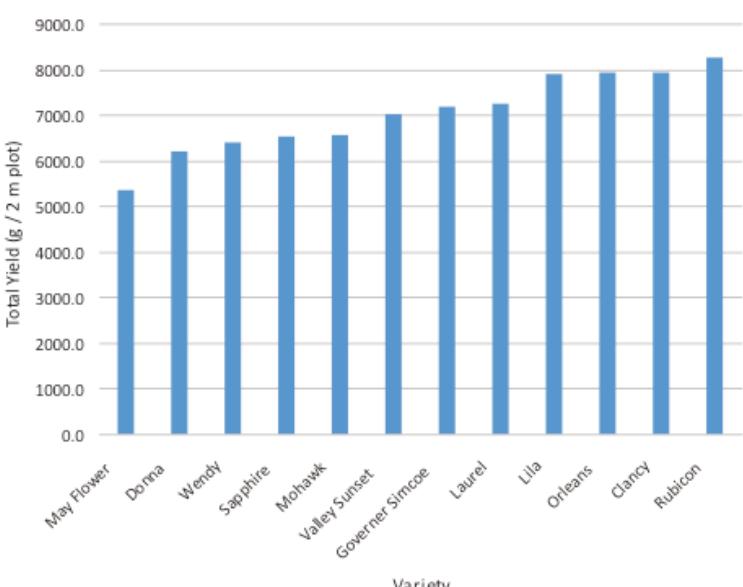
- **Mayflower** is mid-late season variety developed in the U.K. It is firm, with large fruited berries on vigorous plants, but flavour

was bland and below average in our plots.

- **Rubicon** is early-mid season, developed in Connecticut, for its resistance to root weevils. We noticed it was a high-yielding variety with very good flavour and a bright red berry, but the fruit is soft and sometimes small in our plots.

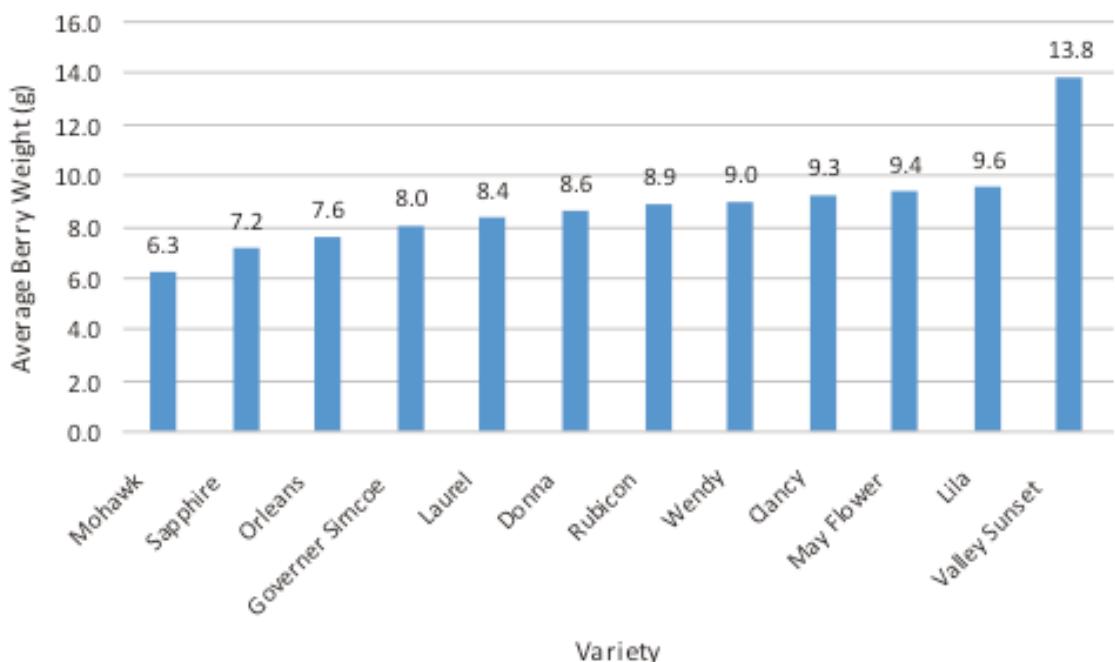
In 2016, a new planting of strawberry varieties was established using dormant bare root and/or plug plants of Malwina,

Total Yield - 2016 Harvest (2014 planting)



Pam Fisher, retired OMAFRA berry specialist, reports on work done by OMAFRA summer students, Ellen Cole, Taylor Leitch and Elizabeth Harlow.

Average Berry Weight - 2016 Harvest



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MINOR USE



CRAIG'S COMMENTS

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CRAIG HUNTER
OFVGA

more. Manjeet was never afraid to ask for senior support -- and he got it most of the time. This was a refreshing change! Some of the infighting between AAFC branches over control of programs and especially budgets was firmly put to rest. Suddenly there was a firm hand at the helm!

I can well remember a very long walk we made together in Cleveland while attending the IR-4 meetings very shortly after his appointment. (I heard later that others watched us leave and wondered who if any would survive that walk!) We became acquainted and became deeply immersed in the program history, the issues, the people, and then on future directions. It became evident to us both that we shared the same passions to make it succeed. We didn't need promises for the future -- the mutual understanding took over. From then on, we could call or email on any issue knowing we had each other's backs. We never saw much of the Cleveland we passed through during that walk, and maybe we should have been afraid of the neighbourhoods too, but our discussions were so intense we just never saw them. There were probably great sighs of relief when we reappeared at the hotel and parted with a firm handshake.

The Minor Use Program soon got turned around and all past projects got caught up in short order while current work did not suffer. New faces augmented the staff to get the workload managed appropriately. The PMC started to take on some new directions as well. Working groups on the invasives such as Spotted Wing Drosophila and Brown Marmorated Stink Bug helped direct efforts at solutions for Canada. Then they got involved with the whole Maximum Residue Limit (MRL) issue by attending the CODEX meetings as part of the Canadian delegation in China.

It was exactly 50 years ago that a classic movie was screened for the first time. Do you remember "To Sir With Love"? It is so apropos since we have just found out we had lost our "Sir," namely Manjeet Sethi, head of the Pest Management Centre (PMC) at Agriculture and Agri-Food Canada (AAFC). He has moved on to another posting in the federal government: their gain and our great loss.

Like many traumatic events, this one is bittersweet as his talents and charisma will no doubt be of great value where he is going, but selfishly I wish we could sequester them for our use longer than perhaps our full share. I state without reservation that the Minor Use Program in Canada would not have achieved what it has in 15 years, without his hand at the wheel the past nine years. He is owed much more credit than he was given.

The Minor Use Program was in a bit of a mess when Manjeet was appointed to fill the vacancy at the helm when the former executive director resigned. Manjeet hit the road running and consulted everybody involved with the program from day one of its beginning. He quickly grasped the problem areas and used his position to correct a lot of issues in short order. These included personnel issues, a huge backlog in work, a lab problem, stakeholder relationships, and



Manjeet Sethi, right, is pictured with Jerry Baron, executive director of the IR-4 program, and Craig Hunter, OFVGA at the Minor Use Priority Setting Meeting in Gatineau, Quebec in 2012.

Manjeet had an advantage over many others at those meetings with more than 85 nations from around the globe. With his black beard and colourful turban, he could mix with ease amongst many of the other delegates. Having grown up in India, and being well travelled around the world, he is so comfortable in those surroundings. It is no surprise that he later made great inroads in China in helping them move forward with development of their own minor use program.

Manjeet spoke at the Global Minor Use meetings in Rome and Chicago, representing Canada and our program so very well to the entire world. We will miss him at this year's meetings in Montreal that he so much influenced in having in Canada for the first time. He was tireless in extending to other countries how our program works and to offer a hand of assistance to them. Many attended our annual priority meetings, and some have now used that model themselves.

All of this does not begin to

tell you of the man himself. He is a proud family man with wife, son and daughter who all adore him. He would talk with us about his upbringing, and the educational trail that led to Canada. His humility was on display when he had a large group of staff and stakeholders to his home for a massive dinner one year. That is a rare event in government circles and it was very much appreciated by all in attendance. His love of good cuisine was to our great advantage that night!

When Manjeet was appointed and named to the position, most of us had never heard anything about him. Not surprising really, as his background was as a veterinarian working with livestock issues. I, for one, had reservations because we did have problems that needed fixing, and a young and vulnerable program which needed a firm hand from one who understood "Minor Use." There was little time to train up a neophyte. Here is the parallel with the movie. In comes a new face, a Sikh, a veterinarian, and

an unknown in the Minor Use world. I can imagine his thoughts on taking over a program in trouble and a cast of characters -- all of whom with ideas on how the program 'should work.'

In his own quiet and effective way he established who was in charge, yet empowered everyone to be a part of the solutions needed. Just like Sidney Poitier 50 years ago!

The Minor Use Program has had many strong supporters over the years. We survived when Dr. Karen Dodds, executive director of the Pest Management Regulatory Agency and strong advocate for minor use moved on. So too will we survive as Manjeet moves on. But we will never forget his contributions and the strong base he has established with a staff of good people, solid departmental support and excellent stakeholder relations.

Manjeet Sethi will be missed, and remembered for his good works.



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MINOR USE

Milstop fungicide expanded for suppression of powdery mildew on globe artichokes and field and greenhouse strawberries in Canada



JIM CHAPUT

The Pest Management Regulatory Agency (PMRA) recently announced the

approval of URMULE registrations for Milstop fungicide for suppression of powdery mildew on globe artichokes and field and greenhouse strawberries in Canada.

Crop(s)	Target	Rate (kg/ha)	Applications	PHI (days)
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Field grown or GH strawberries	Powdery mildew	2.8 – 5.6	Apply at the first sign of disease. Repeat at 7 – 14 day intervals until conditions are no longer favourable for disease development. Maximum 10 applications per season.	0

Milstop fungicide was already labeled for use on a number of crops in Canada for control of powdery mildew.

These minor use projects were submitted as a result of minor use priorities established by growers and extension personnel.

The following is provided as an abbreviated, general outline only. Users should be making

pest management decisions within a robust integrated disease.

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carefully.

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Jim Chaput is minor use coordinator, OMAFRA.

Gramoxone herbicide to be phased out

Health Canada's Pest Management Regulatory Agency (PMRA) recently conducted a Special Review of paraquat and concluded that changes to the Gramoxone Liquid Herbicide with Wetting Agent, Reg. No. 8661 (i.e. "Gramoxone") product formulation and packaging are required.

As a result of this decision, a phase-out of the current product is being implemented.

As mandated by the PMRA, Syngenta will not be offering to sell the current formulation of Gramoxone after March 31, 2017. The last date that retailers can sell this product is September 30, 2017.

Growers may continue to use the current formulation of Gramoxone during the 2017 and 2018 seasons. After December 31, 2018, this formulation of Gramoxone must not be used and must be properly disposed of.

Please contact CleanFarms (1-877-622-4460) for information regarding the pesticide disposal program in your area.

Options to make this tool available to Canadian growers beyond December 31, 2018, are currently being considered and evaluated.

Errandum: Model-timed fungicide applications for strawberry anthracnose fruit rot management

Last month, in the article 'Model-timed fungicide applications for strawberry anthracnose fruit rot management,' Michael Celetti stated that "Supra Captan 80 WDG, Maestro 80 DF, Pristine WG and Switch 62.5 WG fungicides are registered for the management of strawberry anthracnose fruit rot in Ontario."

Of these, only Pristine WG is registered for the management of strawberry anthracnose fruit rot in Ontario. Supra Captan 80 WDG, Maestro 80 DF and Switch 62.5 WG are not registered for strawberry anthracnose fruit rot management at this time; however, they are registered for botrytis fruit rot control in strawberries and will have an effect on anthracnose fruit rot when sprayed to protect against botrytis.

Michael regrets any inconvenience this may have caused. Data has been submitted for a minor use to support Switch 62.5 WG fungicide for anthracnose fruit rot management in strawberries and is currently being evaluated by the Pest Management Regulatory Agency.

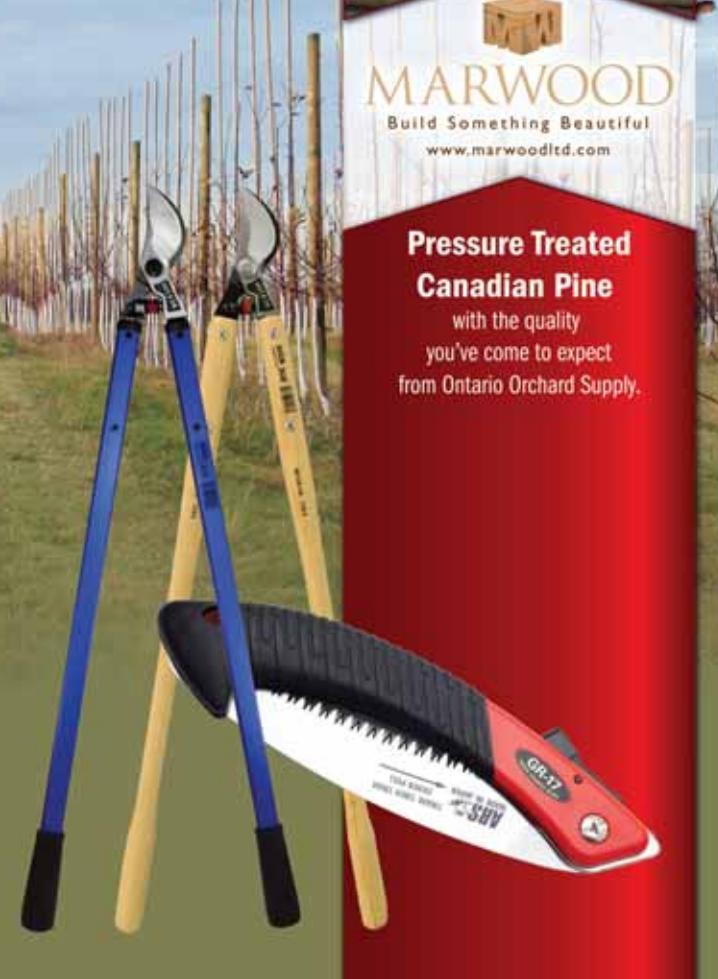


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THE GROWER

MARCH 2017

SECTION B

POTATO PRODUCTION

Sunny mustard brings soil to life



The answer is blowin' in the wind. This mustard crop is a precursor to higher yields and better quality in the following year's potato crops on the farm of Charles Emre, near Windham Centre. After 20 years of trial and error, he's observed that the biofumigant activity of the mustard is one part of the recipe to healthier soils.

Photo by Glenn Lawson.

KAREN DAVIDSON

Mustard has not been a traditional cover crop, certainly not in rotation with potatoes. Charles Emre has discovered, by accident, that mustard's biofumigant properties are a big plus in suppressing nematodes and along with pearl millet, helps to put organic matter back into the soil.

With 700 acres of sandy soils near Windham Centre, Ontario, Charles and

his wife Linda have rejected the traditional two-year rotation of fall rye and potatoes.

"I became suspicious that fall rye was a host crop for nematodes and that the straw was harbouring fusarium," recalls Emre. "I remembered some of the stories of my great-grandfather who immigrated from Hungary in the early 1900s. At that time in Europe, they had no synthetic fertilizers or pesticides, so they used crops such as buckwheat, clovers and mustards."

About 20 years ago, Emre started experimenting with several non-traditional rotation crops that his grandfather spoke of. About a decade ago, mustard came into the picture. Through trial and error, he now plants mustard in mid-April, mows it down in June and then plants pearl millet to prevent soil erosion. Pearl millet is a non-host for nematodes and has the ability to put organic matter back into the soil when tilled under. For several years, there was no change. However,

over time, Emre started to notice that his soil structure was evolving and alive with earthworms. Soil tests were showing anywhere from 50 to 80 per cent fewer nematodes.

"Most research is done on crops that we harvest for profit – potatoes, tobacco, corn and soybeans," says Emre. "But there's been little research on cover crops."

Continued on page 3

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FOCUS: POTATO PRODUCTION

The Netherlands present promising varieties for Canada

EUGENIA BANKS

Every November, the Netherlands host a three-day event for Dutch breeding companies to showcase their varieties and clones for the table and processing markets. Most companies have their offices near the host city of Emmeloord.

HZPC, a world leader in potato breeding, seed potato trade and product concept development, had an impressive display of approximately 150 varieties and clones, with many of interest to the North American market.

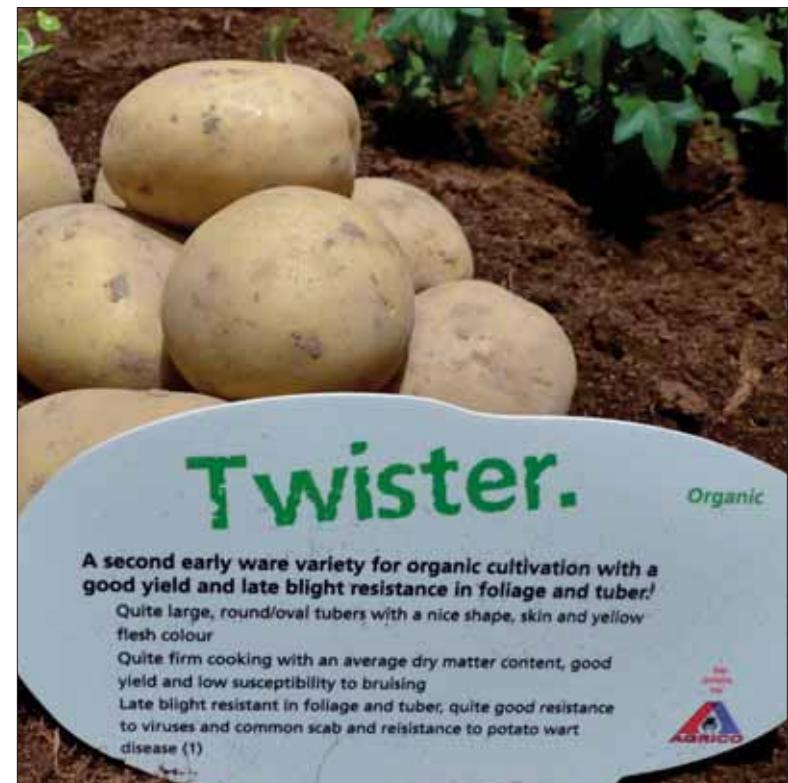
This past season I evaluated HZPC varieties and clones in an irrigated commercial field near Alliston, Ontario. Many of these varieties – Noblesse, Primabelle and Panamera to name a few – were showcased at this show. There were no important differences between the potatoes produced in the Alliston trial and the HZPC display.

Jack Streef, a potato grower from Princeton, Ontario, agreed



that the HZPC new potato variety Briosa looked promising for the Ontario fresh market. Briosa is a medium early, yellow-fleshed variety with attractive oval tubers. It sets 9-11 tubers per hill. The eyes are pinkish, very similar to Yukon Gold. The dormancy

period is medium. Briosa has some tolerance to scab and is highly resistant to early blight. No potato variety is perfect; Briosa is susceptible to the ‘little potato disorder’ caused by hot weather. I will be able to evaluate Briosa in 2017 because it is at the minituber stage in



Twister. Organic

A second early ware variety for organic cultivation with a good yield and late blight resistance in foliage and tuber.¹

Quite large, round/oval tubers with a nice shape, skin and yellow flesh colour

Quite firm cooking with an average dry matter content, good yield and low susceptibility to bruising

Late blight resistant in foliage and tuber, quite good resistance to viruses and common scab and resistance to potato wart disease (1)

favourable traits, both are highly susceptible to common scab.

Den Hartigh is a Dutch affiliate of Solana, a German potato breeding company. This company showcased 50 varieties for the table and processing markets.

Den Hartigh has innovative displays to demonstrate the influence of soil type on the tuber skin-finish and/or any tuber problem that may develop during the growing season. All the varieties were grown at three locations: in a sandy soil infested with scab and in two heavier soils, one with 18 per cent clay and the other with 50 per cent clay. This showed which varieties were tolerant to scab. It also showed how soil type affects yield and skin finish of tubers.

The variety Laperla looked promising. It is early, has light yellow flesh and smooth skin. It is reported to be drought-tolerant and resistant to silver scurf, which is why I would like to include Laperla in a variety trial in Ontario. Laperla is marketed in Canada by the company Solanum International, which is based in Alberta.

Stet Holland is a subsidiary of HZPC. This past season, I evaluated three varieties that were showcased as the most promising: Salinero, Tyson and Zina Red. In my trials, they looked promising.

The breeding companies Meijer, van Rijn, Norika and De Nijl had very interesting varieties in their displays also.

All the breeding companies that I visited were showcasing processing varieties for the chipping and French fry markets. I have evaluated a few of the chipping varieties but the fry colour was not acceptable by Ontario standards.

Eugenia Banks is a consultant to The Ontario Potato Board.

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FOCUS: POTATO PRODUCTION

Mustard brings soil to life

“

Most research is done on crops that we harvest for profit – potatoes, tobacco, corn and soybeans. But there's been little research on cover crops.

~ CHARLES EMRE

”

Continued from page 1

In recent years, Emre has observed a resurgence of interest in cover crops in agricultural publications. For fellow growers, part of the hesitancy in seeding cover crops is the lack of experience with fertility rates, seedbed preparation and even seeding rates. Emre admits he's had many failures with all of these variables.

“Don't treat the cover crop as a charity,” Emre says. “It needs effort and respect like any other crop.”

So Emre's success starts with seed. His mustard seed is all imported, chosen for a high level of glucosinolates, the compound that suppresses nematodes. He plants at the rate of eight pounds per acre with a grain drill that's had minor modifications. Once the crop is in flower, about mid-June, it's mowed down and incorporated into the soil where its biofumigant action takes place. A subsequent crop of pearl millet is planted, a non-host crop for nematodes. Once the pearl millet grows to knee-high, it's also mowed down and allowed to regrow. Come fall, it's mowed and mulched close to the soil where it acts as erosion control of the sandy soils over the winter and provides biomass for earthworms.

The following year, the soil is prepared for potatoes. Emre is observing increased yields with many varieties of potatoes, but also better quality in terms of smooth skins and more flavourful potatoes.

“It's lovely to watch this 24-month cycle,” says Emre. He makes an analogy with a piece of equipment that needs fluids, filters and annual maintenance. “Soil is the most important tool we have. It needs annual maintenance.”

For the coming 2017 season, Emre is branching out to companion crops for potatoes. He will also be setting up research plots to evaluate different mustard varieties for effect on soil-borne pathogens such as nematodes.

There is nothing new under the sun. This is a balance of old and new practices. But of one thing, Emre is confident.

“Sustainable agriculture is a

flat line,” he says. “We're tenants of the land, and if possible, we should pass it on to the next generation better than we found it.”



Photo by Charles Emre

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FOCUS: POTATO PRODUCTION

The future of Colorado potato beetle management in Canada is uncertain

KAREN DAVIDSON

Colorado potato beetle (CPB) has a long history of developing resistance to insecticides says Tracy Shinners-Carnelley, director research and quality enhancement, Peak of the Market.

"Since the 1950s, Colorado potato beetle has developed resistance to 52 different compounds belonging to all major insecticide classes," she told Manitoba Potato Production Days conference on January 26.

Over a decade ago, a survey of Manitoba potato fields was conducted to test CPB for insecticide resistance. The 2002 survey showed that of the five insecticides tested, only imidacloprid (Admire) resulted in 100 per cent mortality. There were CPB populations in all growing regions that were resistant to the organophosphate, organochlorine, carbamate and pyrethroid chemical families. For these reasons, Admire as well as other neonicotinoids continued to be used widely. Not until 2011, was the first imidacloprid-resistant beetle population detected.

Limited resistance testing since then has confirmed that some neonicotinoid beetle populations are present in Manitoba. As Shinners-Carnelley noted, field level failures are uncommon. However, the duration of control within the growing season has declined significantly over time. In recent years, she has observed

overwintering adults successfully feeding on neonicotinoid-treated plants. Scouting for beetles and observing their activity level in spring can be a good early indication of what is to come.

Resistance management best practices recommend that neonic insecticides not be used where resistance is known to occur. However, field observations in 2014 suggested that the use of a neonic seed treatment together with the use of foliar insecticides (spinosyns or diamides) may still offer a benefit to control mixed populations of CPB. The neonics remain effective against other important potato insect pests such as flea beetles, aphids and leafhoppers, an important consideration for an overall approach to insect management in potatoes.

A three-year study is currently underway to evaluate management strategies for control of insecticide-resistant populations of CPB. Researchers are evaluating a combination of registered seed treatments, in-furrow and/or foliar insecticides. With two years of data, Verimark treatments appeared to break by July in both 2015 and 2016. Delegate foliar insecticide continues to perform well. The neonicotinoid treatments provided good control, based on CPB population counts. In 2016, only one of the neonic treatments had CPB counts that triggered a foliar insecticide.

The highest labelled rate of



A collection of spring adults. They can be plentiful in the absence of an effective control strategy.

each insecticide trialled resulted in fewer CPB than lower rates. No significant flea beetle, leafhopper or aphid pressure was observed to evaluate this aspect of insect management.

Shinners-Carnelley concludes that Manitoba growers must adjust practices to manage neonicotinoid-resistant CPB. The continued use of neonics for CPB goes against resistant management practices, but the reality is there are few effective alternatives. Delegate foliar insecticide continues to perform



Spring adult CPB that successfully feed and lay eggs on neonic treated plants are an indication of lack of control.



Egg hatch to 1st instar larvae on systemically neonic- treated plants

well but must not be overused.

"As we enter the new era of CPB control, we need to re-evaluate CPB thresholds for Manitoba by variety," she said.

Of concern is that the Pest Management Regulatory Agency is currently reviewing imidacloprid (Admire), with a proposal to cancel all agricultural uses in the next three to five years. There are no human health risks, says PMRA, but environmental concerns

surround aquatic invertebrates. PMRA has also initiated special reviews for clothianadin and thiamethoxam. The 90-day public comment period is extended to March 23.

The Canadian Horticultural Council has coordinated a submission that includes current use patterns, value and competitiveness, concern over lack of alternatives and potential risk mitigation strategies.

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FOCUS: POTATO PRODUCTION

Research continues on biocontrol of wireworm

KAREN DAVIDSON

Wireworm is such an economic pest that the Prince Edward Island Potato Board has set aside March 28 for a full-day seminar. Biocontrol is one part of the research, spearheaded by Todd Kabaluk, a research biologist with Agriculture and Agri-Food Canada (AAFC) in Agassiz, British Columbia.

Across Canada, potato growers struggle with wireworm problems. Kabaluk's research is working on a wireworm control. He uses *Metarhizium*, a fungus that can exist naturally in the soil and act as a lethal disease for wireworm. With the ability to mass produce *Metarhizium* in the laboratory, he's been able to create powdery green spores that are highly infectious to wireworm, and render them into granules that are applied at planting. Kabaluk discovered a unique *Metarhizium* strain, LRC112, that is highly virulent toward wireworms.

In Europe, the new product Attracap biocontrol has also shown good results, rapidly producing CO₂ and attracting and infecting wireworms within hours of deployment. Placement below the seed tuber and adequate soil moisture are key to efficacy. At around \$400 per hectare, this product is not yet economically feasible in Canada -- although the price is expected to decrease. For now, Kabaluk has found that his version of this product, CO₂-producing rolled oats applied with *Metarhizium*, also attracts and kills wireworms, with a substantial reduction in crop damage.

Kabaluk's biocontrol program also targets the egg-laying adult click beetles with the intention of preventing new larvae from infesting the soil. The overall goal is to reduce existing larvae to sub-threshold levels and prevent wireworm buildup with minimum environmental impact.

This second part of the research has been making use of pheromone granules, invented by AAFC/Kabaluk that could be used during rotation years to disrupt mating of the adult click beetle. Pheromone granules have also been mixed with *Metarhizium* and when applied in bands, beetles are attracted by the pheromone and killed by the fungus. Field studies have shown that almost 100 per cent of the targeted click beetle population is killed.

Further challenges remain in the formulation. Kabaluk says more research is needed to improve *Metarhizium*.

persistence after a rain and to increase the pheromone longevity. New formulations will be tested in 2017.

With results that show larvae and beetles are killed, the move toward commercialization of *Metarhizium* is underway, expected to take place together with a crop protection company.



Rolled oats make CO₂ that attract wireworms where they encounter *Metarhizium* granules, a similar principle to Attracap in Europe.

Wireworms infected and killed by the green spores of *Metarhizium*

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FOCUS: POTATO PRODUCTION

Proactive monitoring stays ahead of zebra chip disease

Even though the insect vector that can spread the zebra chip pathogen in potatoes has been found in Alberta, Dr. Dan Johnson at the University of Lethbridge isn't alarmed yet. He recommends potato growers take no action at this time beyond field sampling.

Johnson, who co-ordinates the Canadian Potato Psyllid and Zebra Chip Monitoring Network and leads the Alberta research project on this topic, says the potato psyllid has likely been present in Alberta in very low numbers for decades but none of the insects found in Canada have tested positive for the bacteria that causes the zebra chip disease.

"The very low level of insecticide use, often none at all, in potato fields in Alberta allows the natural enemies of the potato psyllid to exist," says Johnson. "An insecticide program is costly and, in some cases, can work against other components of the crop ecosystem. When conditions permit, a better scenario is to have healthy populations of insects that are enemies of potato psyllids and other small

insects. In this situation, we may have strong natural controls in place that we can encourage."

Zebra chip has caused millions of dollars in losses for potato farmers in New Zealand and the United States. Warmer environmental conditions and insect movements in air and on transported plants are thought to be responsible for the expanded range of the insects. The potato psyllid, about the size of an aphid, feeds only on potato and tomato plants and some related wild plants, and can transmit bacteria that lead to zebra chip. Infected plants are affected in growth, yield and quality. Potatoes with zebra chip, while still edible, develop unsightly black lines that look like zebra stripes when fried, making them unsellable.

Johnson has led the Canadian monitoring program since it began in 2013 in response to a proposal for collaboration. To test for the presence of the psyllid, sticky yellow cards are placed on stakes in potato fields. None were found in 2013 or 2014 but very small numbers were

detected in 2015 and 2016.

"We've examined up to 2,000 cards a year at the University of Lethbridge," says Johnson. "Last year, we found small numbers of adult potato psyllids in Alberta but none tested positive for the pathogen that causes zebra chip."

The DNA testing is conducted by Dr. Larry Kawchuk at the Lethbridge Research Centre. Scott Meers, with Alberta Agriculture and Forestry, is collaborating on field sampling and design of a management plan. The cross-Canada monitoring network is funded by Growing Forward 2 through Agriculture and Agri-Food Canada and Agri-Science clusters, managed by the Canadian Horticultural Council, with the participation of groups such as the Potato Growers of Alberta.

Article reprinted courtesy of University of Lethbridge, Alberta.

Editor's note: Since this article was published, Dr. Dan Johnson has summarized 2016 trapping results. He reports that 200 potato psyllids were found in 2016 and 100+ from non-potato field sources.



Potato psyllid. Photo courtesy of Dr. Dan Johnson.

So far, testing shows no zebra chip pathogen.

From the University of Lethbridge lab, his team set up and monitored 29 potato fields with cooperating growers and two additional sites for the Potato Growers of Alberta. The cross-Canada network participated.

"By late summer, we found a total of just under 60 potato psyllids in excellent condition," says Johnson. "These adult specimens showed no significant wear and tear and did not appear to have undergone long-distance flights. They were found at low densities distributed over a wide range in Alberta including Picture Butte, Coaldale, Vauxhall, Taber and Bow Island."

Johnson also received sampling cards from Manitoba and Saskatchewan, identifying potato psyllids from both provinces. Excellent data have been received from New Brunswick and smaller samples from other provinces.

"We have a psyllid similar to the potato psyllid species in the New Brunswick cards, but will conduct DNA analysis to determine the species. New Brunswick does not have potato psyllid yet."

Johnson's team is preparing some methods of forecasting development, survival and movement which will involve weather data and GIS. More sticky cards will be sent to participating provinces in spring 2017.

Got Frost?

With another mild winter thus far, we can't help but wonder what's in store this spring. While we all hope for an average spring we need to be prepared for the possibility of an early start. There are many frost mitigation techniques available and the cold air drain is a great choice, especially for those low lying frost prone areas.

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NEW

FOCUS: POTATO PRODUCTION

Best management plan for Dickeya starts with smart buying of potato seed

STEVEN B. JOHNSON

Potato seed tubers harbouring *Dickeya dianthicola* and *Pectobacterium wasabiae* are the only confirmed source of these pathogens. At this point, there is no evidence that either of the two pathogens overwinter in the soil.

The generally accepted length of survival time in the soil for these pathogens is one week to six months, climate dependent. Longer survival is possible on plant matter in the soil. With that, the source of the inoculum, and hence the source of the disease, is seed. Any best management practice efforts on *Dickeya dianthicola* or *Pectobacterium wasabiae* must start with the seed.

- Select seed from farms where *Dickeya dianthicola* or *Pectobacterium wasabiae* have not been detected and seed marketed in previous years has not been associated with *Dickeya dianthicola* or *Pectobacterium wasabiae*.

- Check North American Certified Seed Potato Health Certificates before purchasing seed and select seed that had not been increased on a farm associated with *Dickeya dianthicola* or *Pectobacterium wasabiae*.

- Select seed with zero blackleg levels reported on the North American Certified Seed Potato Health Certificate.

- Select seed that has been PCR tested by an independent laboratory and confirmed to be free of *Dickeya dianthicola* and *Pectobacterium wasabiae*.

- Select seed from farms where a zero tolerance approach to *Dickeya dianthicola* and *Pectobacterium wasabiae* is being implemented. Seed lots with field readings of blackleg present should have reports that suspect plant samples were taken for testing and found to be *Dickeya dianthicola* and *Pectobacterium wasabiae* free.

- Avoid seed from fields where symptoms of *Dickeya dianthicola* or *Pectobacterium wasabiae* were observed, even if affected plants were rogued out.

- Where possible, avoid irrigated seed crops.

- Where possible, avoid planting whole-seed lots that

were stripped from multiple lots.

Dr. Steven B. Johnson is crops specialist, Cooperative Extension, University of Maine.



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FOCUS: POTATO PRODUCTION

An Albertan perspective points to rapid change in the potato industry

TERENCE HOCHSTEIN

So far, the winter of 2016/17 has been anything but typical. Alberta experienced one of the coldest 21-day periods from early December on. Daily power usage set all-time records on a couple of occasions. There has been record snowfall in many areas across North America, with some areas receiving snow for the first time or that much snow since the mid 1980s. Although inconvenient for some, the cold weather has been welcomed by most, as this is what is required to rid the ground of many pathogens that play havoc with many of

the crops that we grow here in Alberta.

During the first week of January, I had the opportunity to attend the Potato Expo in San Francisco, followed by the Washington-Oregon Potato Conference in Kennewick, Washington. One common theme that has come out of these conferences is that the potato industry across North America is rapidly changing. Farm size is changing, practices are changing, with the main focus being on efficiency, adaptability and long-term viability.

As in many businesses today, the margins are becoming leaner each year, producers are

having to do more with less, all the while remaining under the watchful eye of the buying public. As producers, we are constantly having to defend what we do and why we do it. Even with all these factors, there continues to be opportunity for growth in this industry as the processing industry continues to expand across the country.

Lamb Weston will be opening a new facility in Richland, Washington this fall, McCain Foods has recently announced a \$400 million expansion for somewhere in North America and Cavendish Farms announced their new facility in Lethbridge last December. Export sales of frozen product continues to grow year over year at a substantial rate.

Stay tuned for an interesting next five years in the potato industry in North America. Don't blink as you might miss something important.

On the provincial front, work continues on the recently implemented carbon tax in Alberta. There is not a good

understanding of the impact of this piece of legislation on the agricultural community in general.

Terence Hochstein is the executive director of Potato Growers of Alberta, based in Taber.



Canadian Potato Yields 2011 - 2016 (cwt/acre)

Province	2011	2012	2013	2014	2015	2016
Newfoundland	180	175	175	178	162	160
Prince Edward	285	278	281	280	279	290
New Bruns.	245	275	287	298	315	305
Nova Scotia	230	220	237	282	275	270
Quebec	272	265	272	277	301	287
Ontario	175	190	225	235	230	190
Manitoba	250	275	310	308	323	350
Saskatchewan	280	250	275	245	250	250
Alberta	328	342	357	361	384	388
British Colum.	275	275	280	270	274	315
Canadian Avg.	265	274	291	294	305	307

Source: Statistics Canada November 29, 2016

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Tweet or follow

KAREN DAVIDSON

Information is shared quickly these days and what's wonderful is that a simple tweet can lead you to a much richer resource. That's the case with two experts in spraying: Jason Deveau, OMAFRA application technology specialist, Simcoe, Ontario and Tom Wolf, owner of Agrimetrix Research and Training, Saskatoon, Saskatchewan. Examples of their tweets (to the right) demonstrate how they interact with growers. Their Twitterfeed can be viewed, at your leisure, at Sprayers101.com. Both continue to add content for what is arguably the most technical task on the farm.

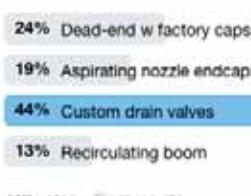
As the technology around sprayers and spraying advances, there are many tips for optimum performance. Videos, tutorials, new equipment reviews – this website is the go-to site. There's a star system for ranking how helpful each article is. If you sign up to the e-newsletter, you'll get an alert when new content is added to the site. Enter a key word in the search bar, and you'll go directly to your subject of interest.

"We even have song lyrics and Haiku about spraying on the site," says Deveau.

Check it out. The humour is pretty good too.

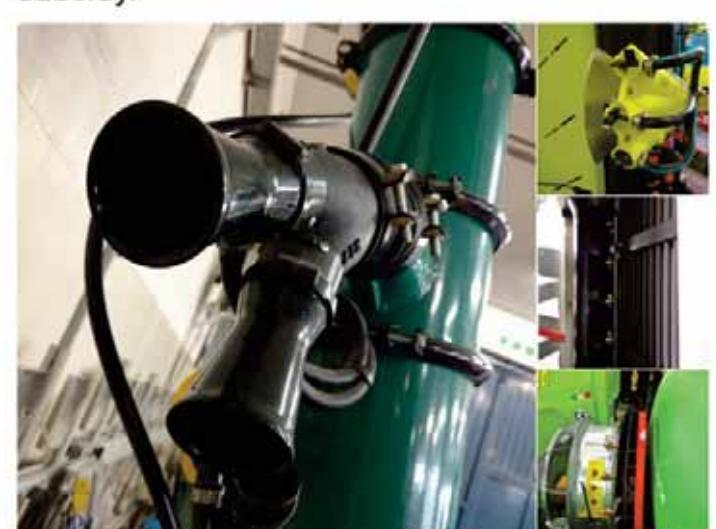
 Jason Deveau
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Public call out:
I'm curious how you deal with sprayer boom section-ends.
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 Tom Wolf
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THE GROWER

FOCUS: POTATO PRODUCTION

Uglies, an answer to potato waste

Dieffenbach's, a potato chip company located in Womelsdorf, Pennsylvania, is receiving rave reviews for its Uglies potato chips. Made from potatoes with minor imperfections, the Uglies brand is marketed with food waste messaging. The company claims that up to 26 per cent of foods are wasted due to cosmetic defects.

The Uglies product has potential for pretty profits, with the raw materials costing half of a regularly shaped, smooth-skinned potato. The chips are a little darker around the edges and come in irregular shapes, but that's the allure to consumers.



Reds, a wedge with an edge

Agriculture and Agri-Food Canada's potato breeders are seeing remarkable results with this year's red-skinned selections. In fact, red-skinned varieties made up half of the total selections AAFC breeders released to industry during the annual Potato Selection Release Open House, February 15, says Dr. Benoit Bizimungu, AAFC research scientist.

From adaptability to the processing market and high yields to disease resistance, these potential new varieties have it all. For the first time, the breeding program unveils a multi-purpose red-skinned selection showing promise for processing as wedges, and as a

traditional table potato. Breeders have also developed Russet selections that have a longer shelf life in cold storage while maintaining stable sugars, making them attractive new selections to French fry processors. These are among 15 new potato selections that AAFC's breeding team launched to industry this year.

The selections were narrowed down from more than 100,000 hybrid seedlings that were grown and tested and measured over six years in AAFC greenhouses, laboratories and fields across the country. The selections are the result of continuing technological advances that are allowing



Photo courtesy AAFC

AAFC researchers to probe the complicated DNA of potatoes to identify genes and strands of DNA linked to favourable traits. This will lead to the development of germplasm with the potential for better yields, nutritional value and cooking

and processing qualities.

The selections also feature disease and pest resistance that make them less demanding on the environment and offer alternative choices for organic growers. With each genetic marker that is identified, researchers are

able to more quickly and accurately search through hundreds of different kinds of potatoes, including centuries-old heritage varieties and wild species, for potential breeding lines that will produce new hybrids with the desired traits.

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FOCUS: CROP PROTECTION AND SPRAYING

How sensitive is your crop to dicamba and 2,4-D?

JANICE LEBOEUF

Are soybeans or tomatoes more sensitive to dicamba? Are sweet potatoes or watermelon more likely to be hurt by 2,4-D? Could crops show visual injury at 1/800th of the rate of one of these products?

In a recent article in Southeast Farm Press, Dr. Stanley Culpepper, University of Georgia extension weed specialist, shared his data on crop sensitivity (visual injury) to dicamba and 2,4-D. Note that most of this data is from trials in Georgia (and some of the crops

on the list reflect that).

Keep in mind, spray drift is not the only way a sensitive crop could be exposed to these herbicides. Residues in the sprayer, even after cleaning, can be enough to cause problems. See Sprayers101.com for resources on sprayer cleaning. And don't forget about the dangers of temperature inversions.

If, in your spraying career, you haven't had any issues with off-target glyphosate damage, are you likely to have a problem with dicamba or 2,4-D?

Dr. Culpepper says that "some crops widely grown in Georgia are 10 to 20 times more sensitive to dicamba

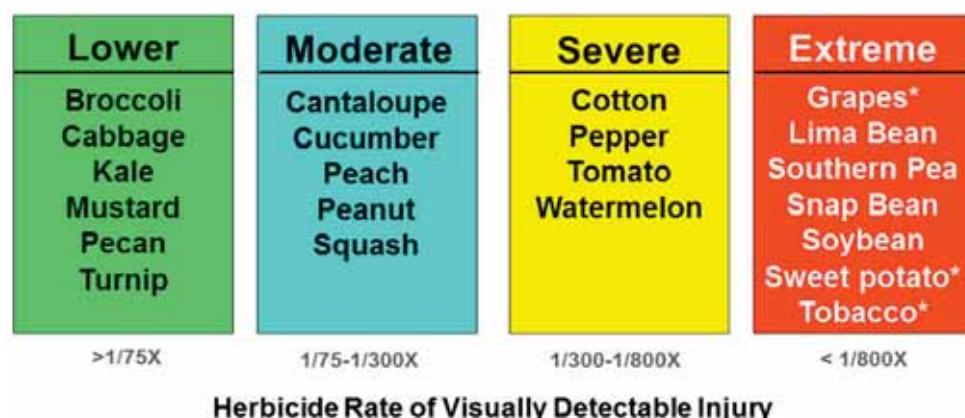
or 2,4-D" than they are to glyphosate. Judging by these visual sensitivity scales, the same could be the case for Ontario. The only thing we can be fairly sure of is that we won't see significant dicamba or 2,4-D injury to cotton here in the foreseeable future.

Thanks to Dr. Stanley Culpepper, University of Georgia Extension, for permission to reprint these graphics.

Janice LeBoeuf is an OMAFRA vegetable specialist, based in Ridgetown, Ontario.

Dicamba Visual Sensitivity Scale for GA - 2017

S. Culpepper, J. Smith, E. Prostko; University of Georgia at Tifton



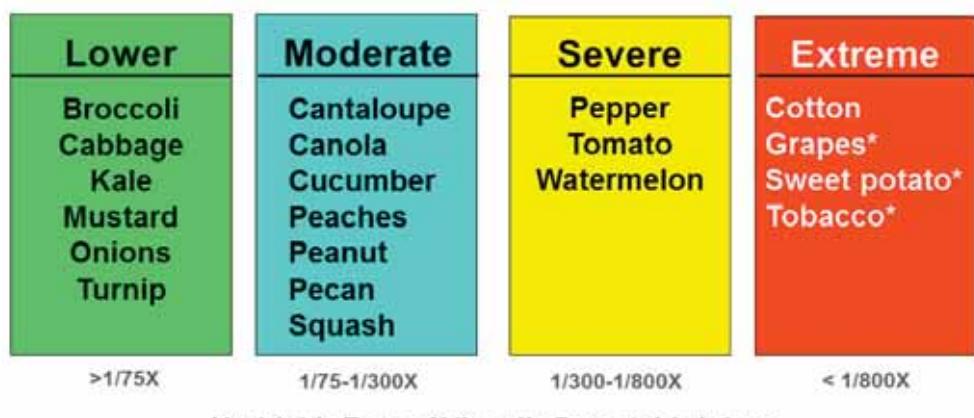
For relative comparison, tomato, squash, and watermelon response to Roundup would be in the "lower" category.

*Asterisk notes data from literature; all other data generated in 64 UGA field experiments.

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2,4-D Visual Sensitivity Scale for GA - 2017

S. Culpepper, J. Smith, E. Prostko; University of Georgia at Tifton



For relative comparison, tomato, squash, and watermelon response to Roundup would be in the "lower" category.

*Asterisk notes data from literature; all other data generated in 64 UGA field experiments.

The University of Georgia and its state partners, the U.S. Department of Agriculture and members of the Crop Protection Research Institute, the University of Georgia College of Agricultural and Environmental Sciences, offer educational programs, assistance and resources to help people learn about and solve agricultural and environmental problems. Any commercial products named, mentioned or illustrated are not necessarily endorsed by the University of Georgia and its Cooperative Extension Service. The University of Georgia and its state partners, the U.S. Department of Agriculture and members of the Crop Protection Research Institute, the University of Georgia College of Agricultural and Environmental Sciences, offer educational programs, assistance and resources to help people learn about and solve agricultural and environmental problems. Any commercial products named, mentioned or illustrated are not necessarily endorsed by the University of Georgia and its Cooperative Extension Service.

Minor use update for berry growers

JIM CHAPUT

URMULE registrations 2016 and 2017 (to date) – berry crops

• Agrimek – caneberries (2 spot-

- ted mites)
- Aim – caneberries (weeds, pri-mocanes)
- Alion – highbush blueberries, raspberries (weeds) [pending final label]*
- Assure – Saskatoon berries

- (grassy weeds)
- Beleaf – greenhouse strawberries (aphids, Lygus bugs)
- Botanigard – greenhouse strawberries (aphids, thrips, whiteflies)
- Chateau – caneberries (weeds)

- Delegate – berries (SWD)
- Kasumin – caneberries, Saskatoon berries (fireblight)
- Milstop – strawberries (powdery mildew) [pending final label]
- Movento – caneberries (aphids)
- Reflex – strawberries (weeds)
- Rimon – cranberries (insects)
- Success / Entrust – grapes (SWD)
- Torrent – raspberries (Phytophthora root rot)
- Venture – caneberries

* 'pending final label' means that the PMRA review of the label expansion is complete and tentatively approved, however the final label step remains to be completed. The timeframe for completion of these pending labels varies considerably from three to eight months.

Other registrations to date in 2016 via registrants

See submissions to Fruit technical working group and OMAFRA Publication 75 Guide to Weed Control & posted PMRA PRD and RD documents

Emergency use registrations 2016 – fruit crops - Ontario

- Mako (crop groups 12, 13-07A) – SWD
- Malathion (crop groups 12, 13-07) – SWD

Active URMULE projects underway

- Approximately 450 active minor use submissions currently in the system. Many have efficacy, tolerance and residue data requirements. A few have occupational exposure or other data requirements to fulfill.
- Approximately 20% of projects are joint with U.S. IR-4 program
- Approximately 12% are minor uses for field crops
- Approximately 34% are minor uses for field vegetables
- Approximately 14% are minor uses for greenhouse vegetables
- Approximately 23% are minor uses for fruit crops
- Approximately 9% are minor uses for ornamentals and turf
- Approximately 8% are minor uses for miscellaneous crops (ginseng, hemp, mushrooms, hops, etc)
- 65% are minor use projects submitted by AAFC-PMC
- 25% are minor use projects submitted by Ontario [some are co-sponsored with PMC]
- 3% are minor use projects submitted by Quebec [some are co-sponsored with PMC]
- 6% are minor use projects submitted by BC
- 3% are minor use projects submitted by the Prairies
- < 1% are minor use projects submitted by the Maritimes

For the rest of the article go to www.thegrower.org.

Jim Chaput is minor use coordinator, OMAFRA

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FOCUS: CROP PROTECTION AND SPRAYING

New tool to detect herbicide-resistant weeds

“

From my perspective, resistant weeds are an even more pressing issue in vegetable crops because there are far fewer herbicides available and resistance management can very quickly translate into costly hand weeding.

”

KRISTEN OBEID

Herbicide-resistant weeds are not a novelty anymore, they are the norm. New cases of confirmed and suspected weed resistance to herbicides are steadily reported in all crops and cases of multiple resistances (weed biotypes resistant to more than one group of herbicides) are becoming more common. There are currently 478 unique cases (species x site of action) of herbicide-resistant weeds globally, with 252 species (147 dicots and 105 monocots). Weeds have evolved resistance to 23 of the 26 known herbicide sites of action and to 161 different herbicides. Herbicide-resistant weeds have been reported in 91 crops in 67 countries (Heap 2017).

We hear about glyphosate-resistant weeds in field crops

regularly. Herbicide-resistant weeds in vegetable crops do not get the same attention. From my perspective, resistant weeds are an even more pressing issue in vegetable crops because there are far fewer herbicides available and resistance management can very quickly translate into costly hand weeding.

To date, there have been limited surveys documenting resistant weeds in vegetable crops. Therefore, AAFC, OMAFRA and MAPAQ (Quebec) are working together to survey onions, potatoes and tomatoes while utilizing newly developed genetic tests to detect resistance as quickly as possible. Most herbicides available for use in vegetable crops are from groups 1 (Venture, Poast, Select, Assure), 2 (e.g. Accent, Pursuit, Pinnacle), 5 (e.g. Gesagard, Sencor) and 7 (e.g. Lorox) and

cases of resistance to these modes of action are largely generated by point mutations in target genes (Heap, 2017), also known as target site resistance.

Therefore, we need your help to test target site resistant markers to develop in-field quick tests. If you have suspected resistant weeds in your onion, potato or tomato fields, we need you! We are looking for:

- Group 1 Resistant Crabgrass Species
- Group 2 Resistant Lamb's-quarters and Eastern Black Nightshade
- Group 5 & 7 Resistant Pigweed Species and Common Ragweed

Involved producers will need to inform OMAFRA: kristen.obeid@ontario.ca after herbicides have been applied and escapes are present in the



field, as well as fill in a survey on field history.

OMAFRA will then collect leaf samples and whole plants from suspect fields and send leaf samples for testing with results back to producers within two weeks (in-season results). If target site resistance is confirmed, recommendations will be provided. If target site resistance is not confirmed, plants / seeds from the field will be used for testing in the greenhouse to determine if the plants are resistant and if there is a new mechanism of resistance (this will take more than six months).

The development of an

in-field quick test for resistance will help to catch resistant weed populations when they are small, prevent their spread by pollen and seed and will help to maintain the use of the few herbicides vegetable producers have.

References

Heap, I. 2017. The International Survey of Herbicide Resistant Weeds. Online. February 8, 2017. Available www.weedscience.org

Kristen Obeid is OMAFRA weed management specialist based in Harrow, Ontario.



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FOCUS: CROP PROTECTION AND SPRAYING

Save the turret to organize extra nozzles

KAREN DAVIDSON

Everybody breaks a few nozzle bodies each year. Save the turret part to organize your extra nozzles.

Paul Van Den Borre offers this tip as a customer service representative at Scotland Agromart, Scotland, Ontario.

"Everybody has spare

nozzles," he says. "Normally they are in a jar or a box. Or they are in a toolbox and get dirty. Take the turret off the nozzle body and use it to store five nozzles of the same kind."

Growers are spending upwards of \$50 per acre for crop protection products. But Van Den Borre sees some growers using 20-year-old technology for nozzles. Spend the money on

good nozzles and use the right nozzle for the right chemical. Nozzle technology has improved greatly in recent years. Each brand has its strengths and weaknesses.

The message is to use the right tool for the job to achieve proper coverage and manage spray drift.

Take the turret off the nozzle body and use it to store five nozzles of the same kind.

**Tips on cleaning spray nozzles**JASON DEVEAU
(@spray_guy)

When operators winterize their sprayers, they should remove all the tips and store them separately. Many store them in large pails. Ideally, a quick calibration before the sprayer is winterized would tell operators if they need new tips: <http://sprayers101.com/confirm-nozzle-and-sprayer-output/>

Let's assume the tips are still accurate and will be used next season.

Just like any other part of the sprayer that comes in contact with spray mix, nozzles should be cleaned regularly. And, just like any other part of the plumbing, the best way to do

that is to dilute any residues in a series of rinses with a detergent added to one of the intermediate rinses. Soaking during that detergent step is an excellent practice.

The orifice of any nozzle is very delicate, either machined or moulded to exacting standards. Even small changes to the orifice shape results in distorted spray (e.g. spray comes out at undesirable angles), and a change to the rate (typically more volume per minute) and the spray quality (typically larger median droplet size). Basically, if foreign objects or residues remain in the tips, the subsequent spray job may be less accurate and even damage the tips.

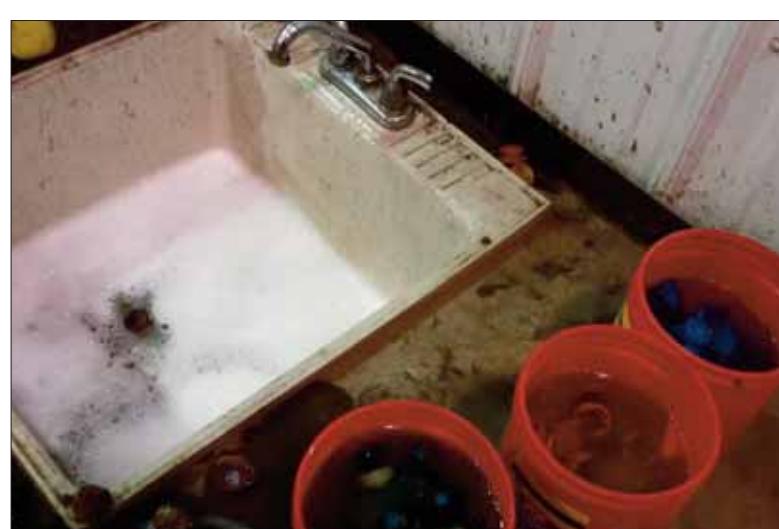
In the case of air induction

nozzles, which are essentially the standard on most boom sprayers and even some airblast sprayers, debris and weed seeds can plug the air-intake ports. When that happens, the nozzle will not function as intended.

So, while the occasional soaking of nozzles does a great deal of good, they also have to be scrubbed. There are nozzle cleaning tools out there, but they're basically toothbrushes. Soft bristles are the way to go for removing stubborn residues and cleaning any tip orifices. Don't use picks or reamers.

Here's a step by step:

1) Wearing gloves, remove all nozzles, rubber gaskets and tips from the sprayer.



Thanks to Jason Boersma (@RVFBoys), Ridge Valley Farms, Ontario, who sparked this article with his tweet: "Great job for a cold winter day, soak and clean all your tips to be ready for spring also saves on down time!"

2) Put them in a large plastic pail and cover them in warm water. Leave them to soak.

3) Drain the pail, but be aware that the rinsate will have pesticide residue.

4) Fill a second pail with a solution of the same commercial detergent used to clean the sprayer.

5) With a toothbrush, scrub the caps, gaskets and nozzles to remove any residue. Some nozzles can be pulled apart to expose the mixing chamber and facilitate cleaning.

6) Once scrubbed, leave all the parts to soak in the detergent solution.

7) Drain the solution, which will contain trace amounts of pesticide, rinse the parts with water and reassemble the nozzles.

This may seem extreme, but of all the technology on a sprayer, the nozzle has the biggest impact on the effectiveness and efficiency of the spray job. Take the opportunity over the winter months to clean and inspect the tips for damage so the sprayer is ready for calibration in the spring.

For more tips, go to: <http://sprayers101.com/sprayer-top-tips-the-twitterverse-has-spoken/>

Dr. Jason Deveau is OMAFRA's application technology specialist, based in Simcoe, Ontario.

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FOCUS: CROP PROTECTION AND SPRAYING

Continuous rinsing achieves same results as triple rinsing in less time

JASON DEVEAU
(@spray_guy)

At last year's Outdoor Farm Show in Woodstock, Ontario, we did a show-and-tell demonstration of an innovative European approach to sprayer rinsing. I asked HJV Equipment to construct a demo unit and plumb a RoGator to see if "continuous rinsing" had benefits over "triple rinsing."

For our demo, we established the following scenario for the RoGator 700, which has a 50 US gallon clean water reservoir and a 700 US gallon tank. The boom had boom-end nozzles (i.e. no dead space at the end of each section) and the operator was able to "blow out" the boom with air from the cab. We sealed this down for the demo unit, and used salt to represent pesticide residue, as measured using a conductivity meter.

Studies have shown continuous rinsing reduces residual pesticide to levels

achieved by triple rinsing, but in considerably less time and in some cases, using less water. Our results concurred: We showed that continuous rinsing achieves the same results in less than ten minutes compared to 30 minutes. Furthermore, the operator never had to leave the cab. That's significant!

Definitions vary, but in Ontario a full cleaning is a lengthy decontamination process performed at the end of a spray day or when switching between chemistries. It requires the operator to deal with any dead-end plumbing such as filters, boom section ends and filling circuits. Rinsing is a less-rigorous dilution process performed every few loads to prevent residue build-up and to dilute any liquid left in the sprayer during transport.

Rinses are far more effective when performed with multiple, low volumes. Once the tank is empty, a volume is pumped from a clean water reservoir into the tank via wash-down nozzles.



Adam Ireland is pictured examining the test sprayer.

It is then circulated for five to 10 minutes through the bypass and agitation circuits before being sprayed out through the nozzles onto the field. This is performed three times and is commonly referred to as triple rinsing.

Legislation in several European countries requires sprayers to have residue levels of 2% (or less) before they can

leave the field, and triple rinsing is too slow. In response, continuous rinsing was developed. Clean water is introduced through the tank rinse nozzles via a dedicated pump. This allows the operator to use the main pump to spray at the same time as the clean water is being added to the tank. So, rather than three serial dilutions of the remaining spray

mix, the clean water pushes the spray mix from behind.

So, while it's still early days, continuous rinsing has promise in North America. We have a lot to learn about which sprayers can be modified, and we want to establish how much residue remains in the dead-end plumbing. Research is continuing into 2017 – stay tuned to www.sprayers101.com.

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FOCUS: CROP PROTECTION AND SPRAYING

Climate change: small shift in degrees, big shift in management

KAREN DAVIDSON

Statistics Canada estimates that across the Great Lakes and the St. Lawrence, prairies, southern British Columbia mountains and west coast, the mean temperature trend has increased anywhere from 0.9°C to 1.7°C in the last 30 years. Those statistics affect most of the horticultural regions.

Kristy Grigg-McGuffin, OMAFRA's specialist responsible for horticulture integrated pest management, recently outlined a number of impacts

on pests. It could mean longer and earlier pest activity or an increased ability to overwinter. Think of wireworms or brown marmorated stink bugs. Warmer temperatures also translate into accelerated insect development. For growers, that means more generations every year and increased pest presence. Think of mites and aphids.

New species are invading non-traditional areas or expanding their range. Think of the spotted wing drosophila and Japanese beetles. Extreme weather events may affect the plant's ability to thwart pest

pressure.

With more pest pressures come increased demands for pest control products which in turn may lead to higher potential for resistance. Some control products may not be as effective when applied at temperatures of more than 30°C. Under these conditions, systemic products might not

have the same level of uptake.

This scenario means that growers, pest scouts and researchers all need to adapt. Grigg-McGuffin says new and updated forecasting models are needed to help support risk management efforts. Improved pest monitoring and surveillance networks are critical. Scouts may want to

revisit the timings of their activity and judiciously map plant protection strategies in new or expanding crops.

Stewardship efforts are intensifying to understand the best mix of resistance management, crop rotation and tillage. Soil health is a part of this strategy.

A primer on climate change

It is important to understand the following terms when discussing climate change.

Weather is the state of the atmosphere at a given time and place. It refers to the temperature, air pressure, humidity, wind, cloudiness and precipitation of a region over a short period of time.

Climate describes the average weather that a region experiences, usually calculated over a 30-year period. It encompasses all aspects of weather—temperature, air pressure, humidity, wind,

cloudiness and precipitation—and is a guide for what kind of weather to expect. While weather can vary dramatically from one day to the next, climate cannot.

Climate change refers to change in average weather patterns and can be caused by both natural processes and human activities. In the past, the earth's climate has been affected by natural factors such as changes in solar output and the discharge of volcanic ash. In fact, the planet has been through many periods of cooling and warming. The last period of major cooling ended

about 10,000 years ago.

Global warming refers to an increase in average global surface temperature.

Greenhouse gases (GHGs) is the name given to a group of gases released to the atmosphere that contribute to the greenhouse effect. Some of these gases are produced by both human and natural processes, while others are entirely human-made. A large proportion of human-made GHGs are produced by

activities that require combustion of fossil fuels, such as driving cars or the production of electricity.

Carbon sinks are reservoirs that absorb and sequester (store) CO₂ from the atmosphere. Examples of areas that can act as carbon sinks include forests, soils, peat, permafrost, ocean water, and carbonate deposits in the deep ocean.

Carbon neutral is a term applied to individuals, businesses, or organizations whose activities

contribute zero net greenhouse gas emissions to the atmosphere. This requires that any GHG emissions produced by an activity must be offset with emissions reductions or carbon absorption in some other activity.

Carbon offset is the process of reducing or avoiding GHG emissions in one place in order to "offset" GHG emissions occurring elsewhere.

Source: Environment Canada website

An in-depth look at three invasive species

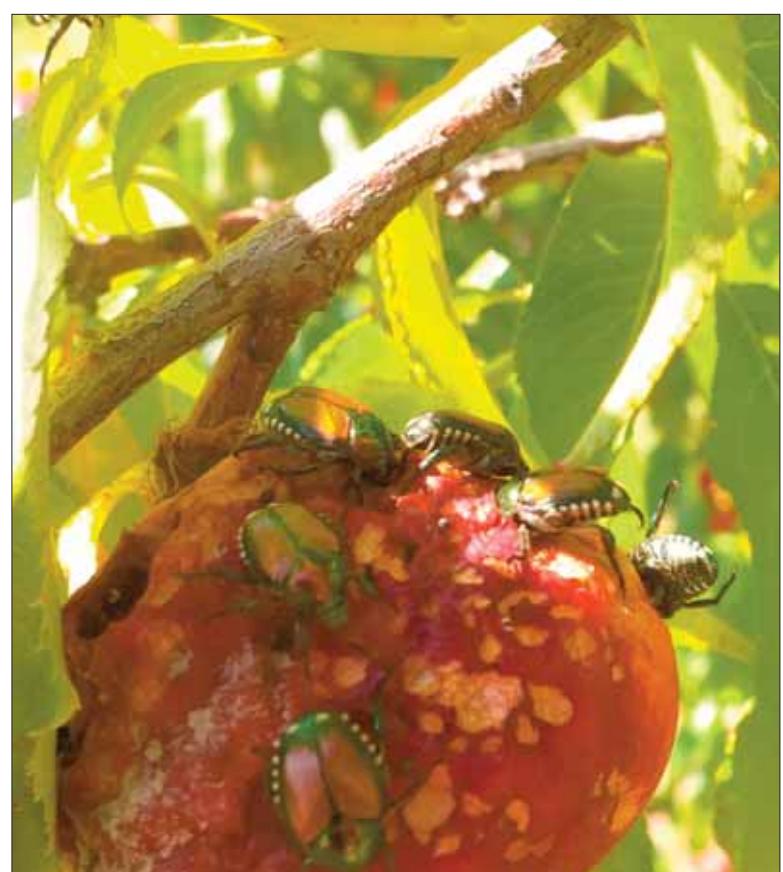
Japanese beetles

Don't be conned by this coppery, jewel-like insect. It leaves a nasty scar. Japanese beetles are becoming a more persistent pest says George Lepp, tender fruit grower, Niagara-on-the-Lake, Ontario. They live in the headlands and are often found in the perimeter of a block, often in the tops of trees. From a scouting perspective, these pests are easy to miss if you don't take a ladder and inspect the most mature fruit.

"You'll get a small spike every now and then but as the summer wears on, the populations increase. They are controlled with spot spraying, but it takes more time, more cost," says Lepp.

Their aggressive feeding scars the fruit, rendering the crop unmarketable. Last summer, Lepp lost 50 per cent of an early-ripening nectarine crop to this invasive pest.

"Japanese beetle can be quite problematic and it seems to be ramping up every year."



Japanese beetles scar the fruit, rendering the crop unmarketable.
Photo by Glenn Lawson.

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FOCUS: CROP PROTECTION AND SPRAYING

Climate change: small shift in degrees, big shift in management

Phragmites

Phragmites, or the European common reed, is far too common for those who care about biodiversity. This bully weed is now spread throughout Ontario and Quebec, hogging water and nutrients. It's often found in standing water such as ditches but can also survive in relatively dry conditions. The roots discharge toxins into the soil, killing surrounding plant species.

While the Ontario Phragmites Working Group has been working on this issue for more than 10 years, phragmites was not on the radar for farmers. However, during last summer's Ontario drought, it became a significant problem as the weed choked important irrigation ditches. The weed is spread easily through its thousands of seed heads. Knock it down and it grows like bamboo, starting another plant at an internodal point.

Growers can distinguish between invasive phragmites and native phragmites with the following points:

Invasive phragmites:

- Grows in stands that can be extremely dense with as many as 200 stems per square metre.
- Can grow so densely that it crowds out other species.
- Can reach heights of up to 5 metres (15 feet).
- Has stems that are tan or beige in colour with blue-green leaves and large, dense seedheads.

Native phragmites:

- Grows in stands that are usually not as dense as the invasive plant;
- Well-established stands are frequently mixed with other plants; and
- Usually has more reddish-brown stems, yellow-green leaves and smaller, sparser seedheads.

Until recently, herbicidal controls of phragmites were limited. Last year, BASF Canada introduced Arsenal Powerline for non-crop, non-aquatic areas.

"We've been participating with the Ontario Phragmites Working Group since it began," says Scott Hodgins, crop manager for horticulture for BASF



Canada. "There are a number of regions, municipalities, conservation authorities, academics and volunteers working to develop and share best practices. Arsenal Powerline can only be used in non-aquatic environments, that is where no standing water is present. Roadsides would be an example."

As a systemic, it translocates to the roots and weakens the plant. The year following spraying, the established spears are controlled and no new phragmites emerge.

BASF is also working to develop a new solution for phragmites in aquatic areas.

"While phragmites is found in every Canadian province as well as the Northwest Territories, the most significant current challenges are in Ontario and Quebec," says Hodgins. "Left untreated, the problem could become severe in many areas of the country."

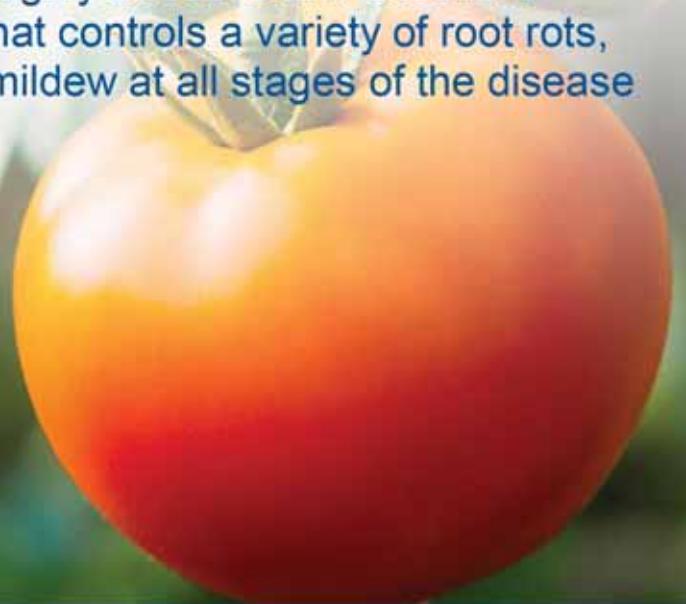


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FOCUS: CROP PROTECTION AND SPRAYING

Climate change: small shift in degrees, big shift in management**Spotted Wing Drosophila**

Will British Columbia's harsh winter beat back spotted wing drosophila (SWD)? Tracy Hueppelsheuser, entomologist for the BC Ministry of Agriculture, isn't counting on it. She shared data with a national webinar audience that showed adult flies were still being trapped in December 2016 despite snow cover, blizzards and cold temperatures.

By mid-February 2017, she had counted more than six lethal days at temperatures of minus 1.6°C – the lethal temperature for 75 per cent of female SWD. That data gives more encouragement that egg-laying may be delayed, but the risks persist in the medium to late-harvesting season. Her temperature data is sourced from Abbotsford Airport, a central point in the Fraser Valley where most of the blueberries, strawberries and raspberries are grown.

Data going back to 2011 show that SWD is becoming a more persistent pest. In those early days of trapping and monitoring, the first egg-laying of females started June 8. In 2016, that date is now an alarming April 8. (see top chart) The insect utilizes a wide variety of hosts for oviposition.

New hosts continue to be found in British Columbia and other regions. Saskatoon berries, Oregon grapes and Indian plum are now on the potential host list.

Raspberries are at highest risk of infestation, especially from mid-pick to end of season. Each blueberry variety carries different risks depending on maturity and the vagaries of the weather. Early-maturing varieties appear to be at least risk, however mid-season varieties are at highest risk. Later-maturing varieties must be monitored closely, factoring in weather and the results of trapping.

In some cases, apple cider vinegar traps have proven to be more successful than home-made yeast-sugar-water baits but those results have been mixed in different regions. In 2015 and 2016 trials, Hueppelsheuser posed these questions. Which trap catches more total SWD? Which trap catches fewer non-SWD drosophila? Which trap catches more mature, egg-laying females?

In May 2016, the yeast/sugar/water and Scentry and Trece baits caught more young risky females. The apple cider vinegar Dro's trap attracted

Year	First egg laying by OW females (261 DD ₅₀)	Peak egg laying by OW females (510 DD ₅₀)	First egg laying by 1 st generation females (565 DD ₅₀)	Peak 1 st generation adult emergence (755 DD ₅₀)	Peak egg laying by 1 st generation females (995 DD ₅₀)	Peak 2 nd generation adult emergence (1249 DD ₅₀)	Peak egg laying by 2 nd generation females (1489 DD ₅₀)
2011	June 8	July 2	July 6	July 21	Aug 6	Aug 24	Sept 8
2012	May 26	June 28	July 4	July 16	Aug 3	Aug 16	Sept 4
2013	May 17	June 21	June 25	July 6	July 21	Aug 6	Aug 20
2014	May 18	June 17	June 23	July 6	July 18	Aug 3	Aug 16
2015	May 10	June 2	June 7	June 19	July 2	July 14	July 29
2016	April 28	May 25	June 1	June 18	July 8	July 25	Aug 10

Dates corresponding with SWD development predicted by the SWD degree day model and Abbotsford airport temperatures in 2011, 2012, 2013, 2014, 2015 and 2016 (OSU Online Phenology and Degree Day Models)

old/less risky females. No baits caught more than 30 per cent female SWD out of the total insect catch. All traps caught lots of non-target insects.

To manage SWD in 2017, Hueppelsheuser advises the following:

- Reduce feeding and breeding sites
- Take an area-wide approach beyond your immediate fields
- Trim/remove hedgerows that are hosts for SWD
- Monitor for SWD female presence using trap of your choice
- Time sprays according to SWD presence when you're planning to harvest
- Shorten picking intervals and handle fruit quickly at processing facility



Photo by Carolyn Teasdale.

Lessons on SWD from British Columbia

The concentration of the berry industry in British Columbia's Fraser Valley makes it a mecca for Spotted Wing Drosophila (SWD). An abundant food supply coupled with mild winters and moderate summers means that SWD fly

year-round.

Carolyn Teasdale, BC berry specialist, provides the backdrop. There are approximately 800 growers of blueberries on 28,000 acres; 100 growers of raspberries on 2,500 acres; 50 growers of strawberries on 600

acres. Almost all of BC raspberries go to the processing industry and about 85 per cent of this crop is exported to the U.S. About 60 per cent of the BC blueberry crop also goes to processing, with about the same percentage (65%) going to the

U.S.

"Growers need to compete with the large berry industry in Washington State," says Teasdale. "Fruit quality and shelf life are important for new export markets."

The cost of failing to treat

SWD can mean a downgrading of product to juice stock. In BC, many growers spray on a six-to-eight day schedule. Most fields receive about three to five sprays in total with Capture, Malathion and Delegate the mostly commonly used products. Growers also use short harvest intervals, weed management around the base of the bushes and cold storage to reduce SWD pressure and damage to the fruit.

Consultants say that trapping is a challenge. The threshold is one fly at the time of fruit ripening, so sprays start before harvest. The most value is in early season-trapping.

Other challenges are that traps are destroyed during machine harvesting and pesticide re-entry intervals impact the ability for weekly monitoring. All of this leads to more costly monitoring.

The berry industry wants more management strategies. There is potential for early season management. However, this requires a better understanding of overwintering refuges and timing of fly movement into fields. The Oregon State University degree-day model can be used to predict the timing of SWD egg laying.

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FOCUS: CROP PROTECTION AND SPRAYING

Comments on the imidacloprid proposal

CRAIG HUNTER

Background

Imidacloprid was first registered in 1995, and cleared all PMRA registration hurdles at that time. The standard 'environment' insect species tested for toxicity used was *daphnia magna*, and it showed only a low level of toxicity. Although the active showed an above normal water solubility, this did not lead to detectable levels in field piezometers (mini-wells) installed in potato fields in Alliston Ontario by the Ontario environment ministry. It also showed an enhanced affinity to bind to soil and sediment, but tests failed to show that was a problem at that time either.

The product was first registered to deal with a serious control problem with Colorado potato beetle in potato. Every other insecticide then available had failed due to widespread resistance. Growers were resorting to using propane flamers for control in the field, and lined ditches to trap the overwintering beetles as they moved into potato fields in spring to begin feeding prior to egg laying. It was a desperate time. The product worked well, and the crisis was averted.

The product eventually had a plethora of additional crops and pests labelled, and became a very important part of the entire pest control program across all crops.

What changed from 2005-16

The success of imidacloprid became its Achilles heel. Because of its widespread use pattern, many fingers began to point to it as the 'possible' reason for problems in the field, most notably bee overwintering issues. Eventually it was suspended from use in France and then the whole EU in an attempt to help reverse their bee loss problem. That move did not change the bee situation, but still remains in effect. Ontario then moved to put serious restrictions on seed treatment uses for corn and soybeans while leaving all other uses as is.

Much research ensued leading to a change in air planters to virtually eliminate the loss to air of residues from seed treatments. The change to a wax versus a graphite seed flow 'fluency agent' also became mandated with a corresponding drop in exhaust of residues. Bee survival had already increased substantially, even before these had been implemented

however, leading to speculation as to the role (if any) of imidacloprid and other

neonicotinoid insecticide seed treatments in bee mortality.

Behind the scenes

Environment Canada (EC) had begun a targeted sampling program looking at neonicotinoid residues amongst others, in creeks and streams across Ontario starting in 2012.

Tied to this program was a critical advance in residue chemistry that enhanced the level of quantification of imidacloprid residues by orders of magnitude. Residues were being 'found' and quantified where there would have been 'non-detects' just 10 years ago, and certainly at the time of registration. EC scientists also began to look for the most sensitive species and the levels of toxicity for those species. They conducted their work in a laboratory and determined toxicity ratings for these species were several orders of magnitude lower than for *daphnia magna*, the 'standard' species required for registration.

The EC results were made available but only to PMRA in 2015, and they immediately began a 'special review' notwithstanding they already had a special review of imidacloprid underway with the U.S. EPA in regard to pollinator health. The results of the second special review were released in Nov 2016 with a recommendation to cancel all outdoor and greenhouse uses due to widespread water residues, and no apparent single source of those residues.

Reaction and moving forward

Growers across Canada were shocked, outraged, surprised, and angry following that announcement. Bayer CropScience was also shocked as there had been no prior warning as is typical in such circumstances. Opposition rallied quickly, and Agriculture and Agri-Food Canada (AAFC) convened a meeting of affected parties in Ottawa Dec 21st 2016 due in part to the widespread potential for harm to Agriculture, and the high profile of this decision. Many presentations were made, and most attendees were made privy to some of the data behind the decision that they had not seen previously, as it was never released with the proposed decision document. Bayer CropScience also made presentations that seemed to refute some of the key pillars of the PMRA document. Both sides agreed to meet and discuss those differences.

Amongst the discussion points, it became apparent that environmental water monitoring was being done by EC, various

provinces, and by some institutions such as universities in the course of research. PMRA had sought out such data, with varying degrees of success. It became apparent that no coordinated approach for field monitoring exists for this or any other actives across Canada.

Discussions led by PMRA were pointed at getting a list of 'alternatives' for if/when imidacloprid uses were suspended. The usual concerns were discussed including resistant populations, efficacy, 'fit' into ongoing IPM programs, costs to farmers, registration time, research capacities (especially for minor uses) and regulatory acceptance of such 'alternatives.' The enormity of the number of crops and pests involved is daunting. There was also a stated concern that registrants may become reluctant to even submit new actives to Canada in the future.

All of this led to another discussion about risk mitigation: how could the existing uses be continued by making changes to how, where, when, and conditions of use.



Daphnia magna is a small planktonic crustacean (adult length 1.5–5 mm) that belongs to the subclass Phyllopoda. *Daphnia magna* inhabits a variety of freshwater environments and is broadly distributed throughout the northern hemisphere.

Meeting outcomes and path forward

The meeting participants agreed to form three working groups: alternatives, monitoring, and mitigation.

The meeting agreed these groups would work from agreed terms of reference and that each group would have weekly conference calls. The entire group agreed to reconvene February 14th.

Each group chose a chair. Monitoring was Sheila Jones-AAFC; alternatives was Craig Hunter OFVGA; mitigation was

Debra Conlon GFO.

Each group will continue to meet as progress is made. They will share all outcomes of their work and it will be used at the next full meeting.

Bayer CropScience and PMRA continue to work together in comparing data.

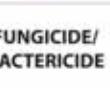
EC plans to continue their monitoring programs in 2017. Provinces and others will continue to source available data and forward it to PMRA for inclusion in final deliberations.

Final date for submissions to PMRA on their proposal is extended to March 23.

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FOCUS: CROP PROTECTION AND SPRAYING

Biotechnology's best years are ahead with products focused on the microbiome

KAREN DAVIDSON

Durham, NC —AgBiome is the biotechnology company which may not be top of mind, but it has a vision of becoming the most successful agricultural innovator. As the “big six” crop protection companies experience mergers, five-year-old AgBiome has attracted more than 75 employees (and growing) who have been directly involved in discovering or developing more than a dozen ag products, some from these behemoths. The result is a much nimbler entity that is exploring the plant microbiome for genes that will solve agronomic threats such as insects and disease.

At AgBiome, how research is structured and funded is as important as what is being researched. In 2016, the Bill & Melinda Gates Foundation thought enough of AgBiome’s track record to award two multi-year grants to research and develop beneficial microbes that can control insects and diseases for smallholder farms in sub-Saharan Africa. And among others, three strategic investors have put up funds, including Monsanto Growth Ventures, Novozymes and Syngenta Ventures, with no special rights for their equity investments.

Why are these investors excited? Leading-edge research is exploring the unseen – the microbiome or small colonies of microbes surrounding plants. Super throughput computers can analyze thousands of soil samples and distinguish high-potential microbial genes. To date, AgBiome has more than 3,500 new insect and nematode control genes in its library. As leaders in microbial genome analysis, they have several products in the pipeline.

As John Rabby, commercial director, explains, AgBiome’s proprietary Genesis discovery platform can isolate individual bacterial strains, from which DNA is extracted for complete genome sequencing. AgBiome currently holds the world’s largest, most diverse, fully sequenced collection of microbes (more than 35,000). With a state-of-the-art, 30,000 square-foot laboratory at their disposal, the researchers are on a high-speed track towards commercialization.

“We are anticipating the launch of our first product, Howler fungicide, early in 2017,” says Rabby. It’s a biological fungicide for control of *Rhizoctonia*, *Phytophthora*, *Pythium*, *Colletotrichum* (anthracnose) and other fungal pathogens. The Organic Materials Review Institute (OMRI) has listed the product, pending registration expected in March 2017. Canadian registration is likely a year away.

“Howler will provide great efficacy on conventional and organic crops. It is going to be a good stand-alone product and tank mix partner with other fungicides,” says Steve Ronyak, field biology manager. “Its current formulation is a wettable powder formulation and mixes readily into water.”

Once registered, Howler can be used to control several diseases in tomatoes, peppers, strawberries and apples, among

PROJECT	BIOLOGICAL	TRAIT	PHASE 0	PHASE 1	PHASE 2	PHASE 3	PHASE 4	Launch
Howler™	●							
Foliar Disease (incl. ASR)	●							
Soil borne Disease Control	●							
Weevil/Coleopteran Control	●							
Soft Bodied Insect Control	●							
Nematode Control (RKN)	●							
Corn Rootworm Control	●	●						
Lepidopteran Control		●						
Sucking Pest Control		●						
Nematode Control (SCN)		●						
New Herbicide MOA		(combined chemical/trait)						

Phase 0 is discovery

Phase 1 is early research; could involve proof of concept in model plants

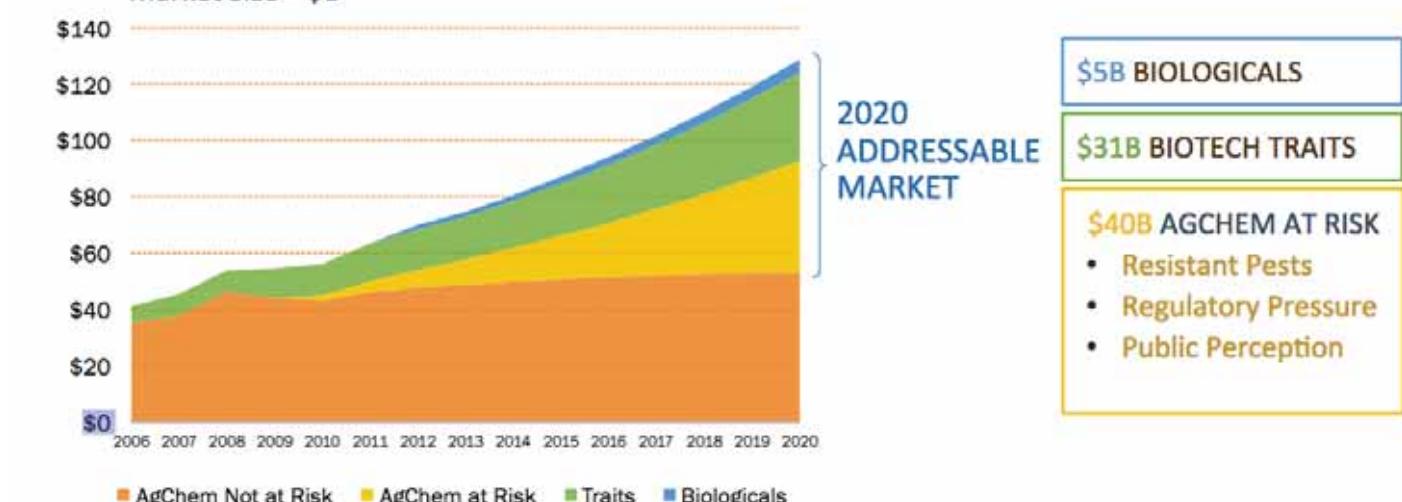
Phase 2 is proof of concept in target crop(s)

Phase 3 is event selection, early regulatory and early product development work

Phase 4 is regulatory, development and pre-marketing – first sales are next

CROP PROTECTION

Market Size – \$B



other crops.

The advent of such products signals a new era in crop protection. AgBiome’s analysis anticipates a \$5 billion market in biologicals by 2020 and a \$31 billion market in biotech traits. The \$40 billion category of synthetic chemicals is expected to decline as more resistance develops in pests to conventional pesticides, regulatory pressures mount on neonicotinoids and public perception sours on the chemical category.

Taking seven to 10 years from discovery to registration of a new active ingredient for controlling a pest is not responsive enough to meet global food needs.

“With high throughput leads, we aim to move from discovery to registration within 18 to 24 months,” says Rabby. “We’re testing seed treatments, new formulations and expanded crop opportunities right now and they could be commercialized in 2019.”

The best brains collaborate

Today’s scientific world is global, and by the day, is reinventing itself in new working cells. That’s why John Rabby has proven to be such a staunch spokesperson for the concept and culture of AgBiome.

Rabby has dedicated his career to innovation in agriculture, with a résumé that reaches back to 1980 with American Cyanamid. When the company was sold to BASF in 2000, he became group vice-president of the BASF Agricultural Division for North America. In 2003, he moved to Makhteshim Agan (MANA), the Israeli chemical company, to become its President/CEO for North America.

He’s been keen on global agricultural projects and has known the founders of AgBiome for many years. He’s been commercial director for AgBiome since 2016.

“The combination of the expertise of our team, our proprietary process and our work culture allows us to innovate more effectively,” Rabby says.

Rapidly approaching the end of the first quarter in 2017, he’s looking for the adrenalin rush of AgBiome’s first commercialized product.

“We’re coming up on our fifth anniversary and we’re launching our first fungicide product, with a lot more in the pipeline,” Rabby says. “Innovation and creativity is what AgBiome is all about, and we’re looking forward to what lies ahead.”



Dr. John Rabby

THE GROWER

FOCUS: CROP PROTECTION AND SPRAYING

Warning signs for farm worker safety

How do you inform farm workers, scouts and others about the Restricted Entry Interval (REI) of pesticides you use? The REI is the period of time after a pesticide has been applied that workers or anyone else must not do hand labour tasks in that treated area. One way to inform everyone of REIs is to post signs at any entrance into treated areas. In collaboration with government and industry leaders, the Ontario Pesticide Education

Program (OPEP) has two designs of ready-to-use signs that growers can purchase to inform others to stay out of treated areas.

With a bright red stop sign shape, both designs warn others, in English, French and Spanish, to stay out due to the potential danger of pesticides. These 12x12" signs are made of corrugated plastic or laminated cardstock and are ready for indoor or outdoor use. One design offers space for the

pesticide applicator to write when it is safe to enter the area. Signs can be viewed on OPEP's website:

<https://www.oep.ca/index.cfm/information/news/for-sale-restricted-entry-interval-signs/>. To order your signs, please call 1-800-652-8573.

Source: Ontario Pesticide Education Program news release.

**Reduce spray by 20%?**

OrchardMAX is a free app developed by the Ontario Ministry of Agriculture, Food and Rural Affairs to improve sprayer efficiency and effectiveness in apple orchards. The app is based on the Crop-Adapted Spraying model, which was tested in semi-dwarf and high-density apple orchards in Ontario and Nova Scotia from 2013 to present day. The primary goal of the app is to help the sprayer operator achieve consistent coverage, no matter the architecture of the orchard block, throughout the season. Research has demonstrated that following the process improves coverage while reducing wasted spray by an average of 20 per cent over the season.

OrchardMAX will:

- Accept metric or U.S. imperial units
- Create an inventory of your orchard airblast sprayers
- Create an inventory of your orchard blocks
- Determine optimal sprayer settings based on the average size, shape and density of the trees in the block
- Propose a pesticide dose for each block, including ideal nozzle rates, water volume and product(s) per tank
- Develop a permanent spray record that can be emailed to the user for archival

The app was developed by AgNition with funding from Growing Forward 2. For more information, go to www.sprayers101.com

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