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NOVEMBER 2019

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On page 12 we sit down for a candid talk with Dave Carey, executive director of the Canadian Seed Trade Association, about the leadership lessons he's learned over the years — and what the future holds as CSTA gets ready to vote on a merger with our four other national seed associations.

"IF WE CAN PUT A MAN ON THE MOON, WE CAN SOLVE 800 MILLION PEOPLE GOING TO BED HUNGRY EVERY DAY."
— Martin Kropff / 18

Photo: Project Apollo Archive

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FROM THE FEED

Shelagh McCartan @ShelaghMcCartan Though we need breeders to develop new varieties and crops, we also need scientists and technicians able to test them and help achieve ISTA's mission statement, Uniformity in Seed Testing. By ISTA president Steve Jones. germination.ca/?p=10847 via @GerminationMag

Sustainable Grain @SustainGrain Who agrees? "My personal interests take me to food. I'm not interested in big yields or commodity agriculture anymore." germination.ca/?p=11188 via @GerminationMag

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A CENTURY OF Setting the Standard

Relationships have been a cornerstone of success for the Association of Official Seed Certifying Agencies over its first 100 years, and they remain so as the future rushes in.

Treena Hein

CHICAGO, 1919. The First World War had just ended, and the world was entering an era of not only rebuilding, but of fantastic new possibilities — and risks. In the agriculture sector, a crop breeding renaissance that had started in the late 1800s desperately needed to be properly harnessed.

"Unless there were standards put in place to prevent outcrossing," explains long-time Association of Official Seed Certifying Agencies (AOSCA) Executive Director Chet Boruff, "all the new varieties being developed at the time would lose their purity."

In addition, notes Randy Preater of the Canadian Seed Growers Association, "around that time, there were some really innovative types in the experimental stations of Canada's Department of Agriculture and land grant universities in the U.S. These were people who thought outside the 'red tape' box about how to build a system to get improved varieties out to farmers. That thinking helped spur development of ag extension services to bring research results to end users."

It was in 1919 when representatives from CSGA met with their U.S. counterparts and decided to form the International Crop Improvement Association (ICIA, which became AOSCA in 1968).

In 2019, AOSCA celebrates its 100th birthday. It's a milestone that deserves reflection for everyone involved.

It's obvious off the top that any organization that reaches a century in age has changed in both major and minor ways and faced its share of challenges — and while a strong and still-relevant mandate has been a key to AOSCA's success, strong relationships have also been essential.

Indeed, in Preater's view (he's served in many capacities at the CSGA and is now a special adviser to the group), the shared history of CSGA and AOSCA has been "a history of exchanging information," whether initially with regulation adoption and adaptation, or more recently, in facing emerging challenges to certification and collaborating on the development of standards for new North American crops such as industrial hemp.

Besides CSGA and 45 U.S. state agencies, AOSCA membership now includes seed certification organizations in New Zealand, Australia, Chile, Argentina, Brazil and South Africa.

"The development of seed grower networks, varietal certification programs and extension services supported by

the Department of Agriculture provided a valuable model for many research scientists and seed growers in the U.S.," Preater explains. "Canada was very involved in ICIA in the early days. It was uniquely positioned as a founding member and I don't think that was ever forgotten."

A relationship with Canada would also allow reciprocal recognition of seed certificates. Indeed, trade facilitation was the primary ICIA objective. It was all about creating, says Preater, internationally-recognized minimum equivalent standards for seed certification that would allow seed to move smoothly across the border. A few decades later, AOSCA variety review boards were created, which developed uniqueness eligibility requirements (such as distinct, uniform and stable) for varieties entering seed certification programs, a vital identity assurance function provided in Canada by the CSGA and the Canadian Food Inspection Agency (CFIA).

A significant step on the communication front was taken in 1955, when ICIA members attended a CSGA annual meeting for the first time. "It meant a lot," Preater says. "It was the forging of relationships that would be important at all times, but critical in a crisis."

Adaptation to change

If relationships have been essential to AOSCA's success, so has been the willingness to evolve as the seed industry has evolved. One example of this, in the view of Dale Adolphe, occurred when private plant breeding in the U.S. started up and companies began branding their varieties instead of certifying them.

"Certification agencies in some states struggled to stay alive," notes Adolphe, who is a previous CSGA executive director and served in AOSCA for almost 15 years, including as board president. "Among other options, these state agencies looked at certification of organic, non-GMO and insect refuge management. To foster these new areas of certification, AOSCA hired a full-time executive director, Chet Boruff, and that has seemed to work well."

As the seed industry became more global, AOSCA again adapted. In 2004, its governance model was restructured from a board made up of all its member agencies to a board with two members from each of four regions, one being international. This change, says Adolphe, greatly enhanced the status and relevance of AOSCA on the world stage.

When variety developers wanted verification standards beyond the minimum certification standards, AOSCA (in 2012) added an Additional Certification Requirement (ACR). This scheme allows options from increased isolation distance or previous land use standards to post-harvest seed testing requirements. Recent specific ACR examples in the U.S. include increased (over 30 times) isolation distance certification requirements for the only white-flowering, higher-protein crimson clover.

In Canada, ACR examples include the unprecedented protocols required to certify varietal blends of midge-tolerant wheat varieties. "The insecticide sprays for this midge were difficult to apply, expensive and tough to time, so it was quite a breakthrough by breeders to get this tolerance into wheat genetics," Preater explains.

"The economic benefits of these varieties for producers were huge, over $40 million per year, but could be quickly lost if the seed was not planted as a 10% blend with a refuge variety. Wheat varietal blends had never been certified anywhere before. Certification up to that point, by definition, was always for one variety." To certify these varietal blends of midge tolerant wheat, the CFIA revised seed standards and variety developers asked CSGA to use the new ACR option for crop certification.

In the future, as genetic testing becomes more affordable and cost effective, Preater can see some variety developers finding the ACR option useful for unique trait verification.

Opportunities on the horizon

Going forward, the organization is well positioned to take advantage of more new situations. One of these is the advent of CRISPR and other gene editing advancements.

"It could be huge for small and medium enterprise (SME) variety developers," says Preater.

But whether it is genetic techniques or other industry developments, the fact that AOSCA members can act independently and be responsive to the needs of their local markets is a definite strength.

"We have 50 member organizations across eight countries," notes current AOSCA board president Bill Foote of the North Carolina Crop Improvement Association. "That means a lot of collective knowledge. We have lots of retirees who are still active in various programs. This amount of experience is a real bonus."

However, Boruff adds that, "Across the board, we need to build the next generation of this industry. Experience and historic knowledge are very important, but we also need to get the word out that there are good and fascinating careers in this industry and attract talented young people."

In terms of current directions, Foote is of the view that AOSCA should expand current services and also add new ones.

"We do a lot of counter-season multiplication of seed, and there is growth there for all countries," he says. "I think AOSCA needs to keep its eyes open for non-traditional certification opportunities that might come up, such as auditing and verifying acreages. I also think there is the opportunity to offer different levels of certification. We need to ask seed producers what else they need, while maintaining our traditional services too."

Because traceability and transparency in the food system has never been a bigger issue, Boruff believes ASOCA's services will continue to be in demand.

"Keeping up with the pace of change is not easy," he concludes, "and the pace is likely only to increase. But I believe, as they always have, AOSCA and its member agencies will keep up." ■

NAPB GROWS TO MEET THE FUTURE

The National Association of Plant Breeders holds its biggest-ever meeting as its growing membership works to tackle the challenges posed by regulatory and climate changes. Marc Zienkiewicz

GETTING BIGGER is a challenge that many organizations wish they were faced with.

Peggy Ozias-Akins and the organizers of this year's meeting of National Association of Plant Breeders (NAPB) in Pine Mountain, Georgia, found out first-hand what it's like to facilitate the gathering of a rapidly-growing group of professionals working to make a difference.

"We were scrambling a bit when we found out just how many registrations were coming in," says Ozias-Akins, plant breeder at the University of Georgia (UGA) and chair of the organizing committee. "It's a great problem to have, and it's so gratifying to see this group grow as word gets out about the NAPB."

With over 400 people attending the ninth annual meeting of the NAPB from Aug. 25-29, 2019, it was a record turnout. With 451 members, the NAPB is also enjoying its highest membership to-date. As many groups in an array of industries work to simply maintain their numbers, the NAPB is enjoying continual growth since it was founded by the Plant Breeding Coordinating Committee (PBCC), which works to advance the interests of public sector plant breeders in the United States and beyond.

By contrast, the NAPB strengthens both public and private sector plant breeding to promote food security, quality of life and a sustainable future. It represents both American and Canadian breeders, and while its growth shows that plant breeding is as important as ever — perhaps more so — it also shows that there's a lot of interest in helping reverse what some see as a decline in public sector plant breeding.

According to new PBCC chair Michael Kantar, an associate professor at the University of Hawaii, the NAPB's growth comes as the PBCC is developing its new strategic objectives in light of changes within public sector plant breeding — like the recent announcement that the National Institute of Food and Agriculture (NIFA) is being moved out of Washington, D.C. to Kansas City.

Many NIFA staffers — about two-thirds — have chosen to quit rather than relocate, causing concern that NIFA offices will be staffed by skeleton crews that lack the resources needed to do their work.

"As a discipline — in terms of sheer numbers — public sector plant breeding isn't healthy. We need to look to the future and figure out how we can keep public sector breeding healthy and move it forward," says Kantar. The PBCC, struck in 2006, held its annual general meeting as part of the event in Pine Mountain.

"Every five years we have to decide what our new objectives are, how we promote plant breeding, how to ensure we continue with this discipline that's fundamental to human survival. We're in the process of drafting our new objectives and finding people who want to take these on."

One proposed objective is to foster communication among public breeders and federal agencies on public policy issues, including alerts to existing and emerging threats to agricultural security that affect plant breeding.

"There are some things we will always do — like trying to identify what capacity we have for plant breeding; keeping track of all the public sector breeders across the country; we will always care about germplasm; we will advocate for plant breeding. But we want to ensure everyone knows and cares about it. We have a lot of room to do new things beyond what we've traditionally done."

Boosting Private Sector Involvement

In the spirit of trying new things, the NAPB has estab-

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lished a new Industry Committee, which it hopes will synergize more industry participation.

"We want to try and bolster interaction between public and private sector scientists. There are some sectors of the industry that have been very active in the NAPB over the years and others less so. The more people we can involve, the better," says Ozias-Akins.

Led by past-president Klaus Koehler, the committee will expand the exposure of commercial plant breeding activities to NAPB membership through the creation of opportunities for mentorship, training, sabbaticals and other collaborations.

Part of the NAPB's mission regarding mentorship includes the Borlaug Scholars program, which enables attendance of future leaders at the NAPB annual meeting by providing funding to both undergraduate and graduate students. The scholars — of which there were 12 this year, up from eight the year prior — are paired with mentors who work with them to help the students figure out their career path.

Several of this year's Borlaug Scholars have had experience working for private sector companies during the summer months and beyond, which only strengthens the NAPB's involvement with the private sector, adds Ozias-Akins.

"To feed a growing population in the face of climate change, combining advocacy with communication and education helps us get that message out."

Facing Climate Change

A big theme of this year's meeting in Georgia was adapting to future concerns such as climate change, which presents a variety of challenges for breeders. Delivering the keynote address this year was Jeffrey Bennetzen, a geneticist at UGA. His talk addressed the need for plant breeders to introduce new sources of genetic variation in order to breed the crops of the future.

He asked audience members to raise their hands if they thought they'd be growing the same crops in the same places two decades from now. Only a few hands went up.

"Plant breeding has accomplished some amazing things over the past 75 years, but it's occurred at a cost," Bennetzen said.

He went on to show how, according to the United Nations, the number of undernourished people worldwide has gone up every year since 2015. Almost one billion people are now considered malnourished around the globe.

At the same time, the rest of the world consumes far less protein per capita than Europeans and North Americans. Inputs like water, fertilizers and high-quality land are becoming less available and/or more expensive, he noted.

Add to this the effects of climate change, and plant breeders everywhere have their work cut out for them in an effort to bring genetic diversity back to crop species.

According to Bennetzen, plant breeders have three powerful tools at their disposal — genome editing (which can create targeted diversity); wide crosses (which can harness traits from distantly-related species); and microbiomes (which can provide a source of genetic variation that benefits crop performance).

Michael Kantar, plant breeder at the University of Hawaii and chair of the Plant Breeding Coordinating Committee, says working to strengthen public sector plant breeding is crucial.

"It's only been over the last 10,000 years or so that we may have been in a period of low climate variability, which may have made agriculture as we know it possible. The agriculture of the future will be very different, and we need to think over the even longer term than what we've been used to."

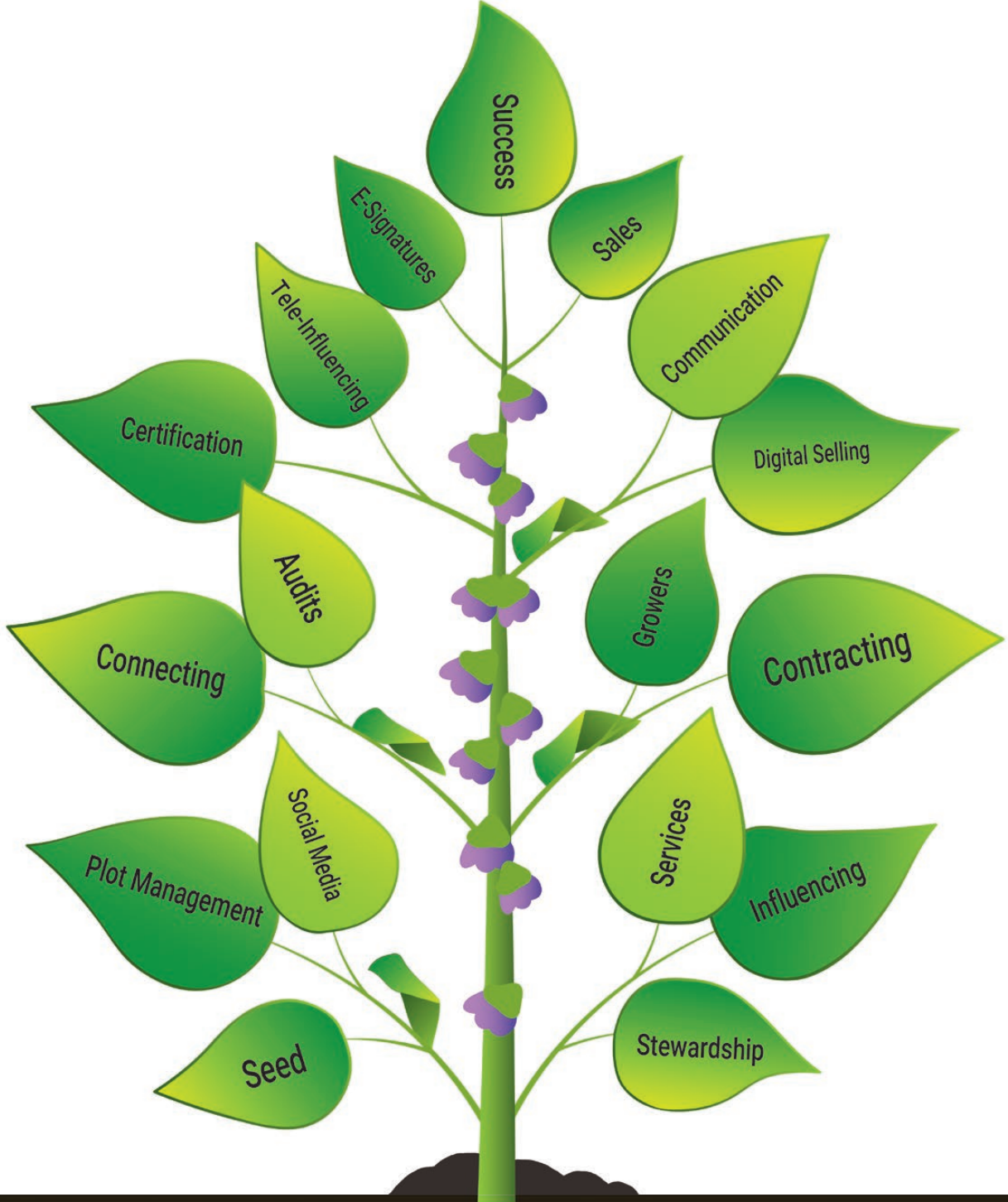
Meeting attendees were treated to tours of two University of Georgia campuses — Griffin and Tifton. UGA plant breeding programs have developed over 400 commercialized plant cultivars since 1990. Of those, 40% are agronomic crop cultivars, 30% are cultivars of horticultural food crops, 27% are ornamental plant cultivars, and 4% are turfgrass cultivars — the latter having widespread usage on golf courses and athletic fields throughout the southern United States and in several countries, notably on athletic fields hosting World Cup, Olympic, and Super Bowl events.

As explained by UGA turfgrass breeder Paul Raymer, public concerns over climate change are creeping into the turfgrass realm, with demand for drought-tolerant varieties in the rise.

"Every market area has different demands. Right now, homeowners want something they don't have to water a lot and mow as often. All these requirements add up and what we wind up with are a lot of small breeding programs that look a lot different from most others," he said.

"As turfgrass breeders, we're decades behind other crops in terms of genetics and genomics. We're making progress is applying those tools — they're a lot more affordable and you're going to see them more widely adopted in the future." ■

WHERE ON THE WEB For video and podcast interviews from this year's NAPB meeting, visit **seedworld.com/napb-2019/**



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WHY THE CSAAC SEAL IS THE KEY TO QUALITY

Krista Erickson, CSAAC Executive Director

CERTIFIED SEED THAT is sold to producers has gone through a rigorous regulatory process before it goes to the field. The crop is regulated throughout the growing period, the fields are inspected, and the crop is harvested. The seed is then sampled and sent for testing at an accredited lab. This is where government-accredited seed testing labs enter the picture. The lab ensures that the seed that is entering the market meets the purity and germination standards required.

How do you know that all of the seed being tested across Canada meets an approved, uniform standard? The Canadian Food Inspection Agency (CFIA) regulates the labs through audits performed by the Canadian Seed Institute (CSI). Initially, a lab must design a quality assurance manual that includes the guidelines set out by the CFIA.

> "THE CFIA WILL INFORM THE LAB OF ANY INCONSISTENCIES AND CORRECTIVE ACTION MUST BE TAKEN — THIS TOO IS MONITORED TO ENSURE COMPLIANCE."

After receiving an application for accreditation from the lab, the CFIA will send out an auditor to ensure the lab is following its quality manual and the manual and lab meet all the CFIA requirements. Sample proficiency testing is also done at this time. A successful seed testing laboratory will be given a letter of accreditation and an accreditation number. Please look for this number on your seed testing Reports of Analysis.

An accredited lab will be audited by qualified auditors and technical experts from CSI every three years. They will do an onsite inspection of the lab to ensure that the lab is following its Quality Manual, the Seed Laboratory Audit and Accreditation Protocol, the Canadian Methods and Procedures for Testing Seed, the Canadian Seeds Act and Regulations, any industry regulations and the procedures and work instructions designed for that lab and their customers.

Once a lab is accredited, they receive two proficiency testing panels every year. Labs must pass these proficiency panels to maintain their laboratory's scope of accreditation. The panels cover all six CFIA crop groupings over a three-year cycle.

The CFIA will inform the lab of any inconsistencies and corrective action must be taken — this too is monitored to ensure compliance. Labs must also perform internal monitoring every year to verify the lab's proficiency in testing seed against the lab and regulatory standards. These records will be available for review by the auditors.

In addition to the government required monitoring of seed labs, some labs have chosen to have their seed analysts become members of the Commercial Seed Analysts Association of Canada (CSAAC). Member analysts are required by CSAAC to maintain educational standards to ensure they are current with the industry and consistent in their seed testing procedures. Regular bulletins are sent out to the members through the CSAAC office to ensure they are immediately aware of changes in government regulations so that seed is analyzed to the most current standard.

CSAAC works with CFIA on the Methods and Procedures for Testing Seed (M & P) committee where they provide, accept and review potential proposals for changes to the M & P to ensure that the regulations reflect what is happening in the seed industry. The discussions resulting from this relationship have proven to be of benefit to the industry, the seed labs, government and producers.

Remember to look for the CFIA accreditation number of the lab and the CSAAC Seal and signature of the CFIA accredited analyst/CSAAC member to ensure that your seed has been analyzed to the highest standard. ■


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LESSONS IN LEADERSHIP

The executive director of the CSTA sits down for a candid talk about his early life, being an effective leader, and why he's willing to risk his own job for the greater good. Marc Zienkiewicz

SINCE 2017, Dave Carey has been executive director of the Canadian Seed Trade Association (CSTA). He originally started at CSTA in 2012 as stakeholder relations coordinator. Prior to his career with CSTA, he worked as a legislative assistant for Members of Parliament from Calgary, Alta. and Oakville, Ont.

As the CSTA gets ready to vote in 2020 about whether or not to merge with Canada's other four seed associations, we thought it a good time to sit down with him and find out who he really is, get some insights into his leadership style, and how he feels about this whole Seed Synergy initiative.

Germination: You live in Ottawa now, based at the CSTA head office. Where are you originally from?

DAVE CAREY: I grew up just outside of Toronto in Oakville, Ont., the oldest of three siblings. Both my parents were bankers. We were very comfortable. I spent my summers playing golf and soccer and fall and winter playing hockey. My parents stressed the importance of doing well in school and that anything was possible if I put my mind to it. I always figured I'd be a lawyer, but politics came calling at a young age and the

rest is history. My favourite memories are of my late dad taking me to early morning and weekend hockey practices, games and tournaments and watching sports and movies together at home in our "man-cave" basement.

Germination: Sounds like a good upbringing, but what's your least fond memory of it?

DC: That would be when my parents divorced. Not so much the divorce itself, which was the right call, but the move my mom, siblings and I made from Aurora, Ont. to Oakville, Ont. Funny how at the time I thought the move was akin to the end of the world, while in hindsight I may not be who I am now had we not moved to a larger, more dynamic city.

Germination: You now lead the CSTA staff as executive director. Were you always a natural leader or was it an acquired skill?

DC: I was usually the captain of my hockey teams and tended to gravitate towards leadership from a young age, maybe because I don't really like being told what to do. But I was also surrounded by leaders growing up — my parents, grandparents, aunt and uncle were all leaders and successful in their own fields and in their communities. They made decisions in their careers — sometimes tough ones —that impacted others. They could always justify what they did and were willing to stand by the calls they made. My youngest sibling is 10 years younger than I am — when we moved to Oakville I, in a way, became the leader and helped my younger siblings through the transition process. We're still very close.

Germination: Looking back on the past three years as CSTA executive director, are you happy with your decision to lead the organization?

DC: Absolutely, but that's because I knew what I was getting into. During the hiring process, I interviewed the executive as much as they interviewed me. I made it clear I wanted to focus a lot on policy and getting things done, and less on housekeeping and processes. I wanted to expand the staff, which they let me do — 60% of the staff are now my hires. We've become very multi-disciplinary. Lauren Martin is our resident "farm kid" and lawyer and has really embraced her role as government & industry relations lead. Claudio Feulner, with his science background, has been a great addition as regulatory affairs and trade manager/guru. Liz Lumsden came from public service to fill the role as communications and member services manager, joining us at a very hectic time right before the joint AGM with CSGA. Kristen St. Denis, our executive administrator and meeting planner, remains the true backbone of CSTA and our longest-serving employee. CSTA increasingly mirrors the companies we represent — we change, adjust and adapt. I've seen us build more and more bridges over the past few years. For example, we've spent time working with other organizations like Grain Growers of Canada and the Canadian Federation of Agriculture. We've built new alliances. We're all in this together, something we've come to realize more and more through Seed Synergy.

Germination: Ah yes, Seed Synergy. The big topic on everyone's mind. I won't bother asking you to explain what it is — for those who don't know by now, the search box on germination.ca will tell them all they need to know. What does Seed Synergy represent for you and CSTA? Are you at all worried it might disband the team you've built?

DC: Seed Synergy is about delivering greater value to members and finding efficiencies — not staff redundancy. I envision a single organization that will need to do some headhunting to actually increase the number of folks on payroll. I always say the person whose job is most at risk is mine, and I'm gung-ho about going ahead with it while providing my team the leadership they deserve during the transition. I think they know I have their back. They're a smart, dynamic group. It is my hope that this time next year, CSTA no longer exists and we're into the beginning of the new organization. The five organizations coming together is the definition of success and anything less would be a kind of failure.

Germination: In 2020 all five seed associations will vote on whether or not they want to go ahead with the merger and form a single national organization. Are you at all concerned one or more of them might vote no? And what happens if that occurs?

DC: We've been consulting for several years now. We held six workshops across the country, launched seedysynergy.net, did surveys and solicited feedback at every opportunity. CSTA also updates our members through Trade Winds and our members web section on a regular basis. The idea of getting consensus is great, but what does consensus

THE 411 ON DAVE CAREY

Age: 33

Hometown: Oakville, Ont.

Current city: Ottawa, Ont.

School: Brock University and Schulich School of Business, York University

Relationship status: Married for 8 years to wife Jovette Carey

Children: 2

Favourite food: Pizza

Favourite movie: *The Godfather I/II*

Favourite book: *Shogun* by James Clavell

Motto: "Fortune favours the bold."

really mean and how do we achieve it? Striving for full consensus can result in kicking the can down the road. I'd be surprised and disappointed if next summer any of the organizations said they need more time to vote because they're not done consulting. I hope everyone participates in the new organization and helps direct its policies, but we can't possibly sit down and talk to everyone in the seed industry — there's 60,000 people employed in our sector. We need a representative sample of our collective members and then we need to make the big game-changer decisions. That's what boards and leaders are for.

The CSTA's activities on Parliament Hill are an opportunity for association members and staff to meet with MPs. From left: Dave Carey, CSTA executive director; Harold Albrecht, Member of Parliament; Lauren Martin, CSTA government & industry relations lead; Phil Bailey, SeCan eastern business manager.

Germination: Yeah, I guess you eventually have to bite the bullet and just merge.

DC: I think we will be successful in doing that. It's up to members and stakeholders to vote in favour of it, of course, but it would be a detriment to the whole initiative if one organization decides not to be a part of the merger. I think that organization would have a hard time explaining to its members, after investing all this time and money consulting, why they would decide to pull out at the last minute. I think it would also hurt that organization's standing with members, our value chain partners as well as government. It's been a significant effort in terms of people power and resources, so to get cold feet and not move forward would be tough to justify. It could happen, but I think it's pretty unlikely.

Germination: Would you say that would represent a failure in that organization's leadership?

DC: If, for example, at the 11th hour CSTA decided to pull out of this and not move forward with the merger because members didn't receive the right kind and amount of information or that the notion of change hadn't been properly socialized, then I wouldn't blame my board for looking to replace me as executive director. After spending years talking about this and then at the last minute saying we won't proceed because we're not getting everything we want, that would be very short-sighted on our part. Compromise is key, so long as we aren't compromising the well-being of the seed industry. There's a point where you need to know when to say, 'Enough is enough, we have what we need to move forward.' That's called leadership. We're doing this to better serve our collective members — period.

Germination: You made what some would say was a bold leadership move at the 2019 CSGA/CSTA joint annual meeting in Whistler, B.C., when you moved to add a proposed third model for value creation to the agenda for discussion. You took some heat for that. Why did you do it?

DC: Yeah, I got some phone calls from members as to why we were giving a podium to this and why our meeting was serving as a launching pad for a model we don't endorse. We have a preferred model and I stand by the trailing royalty/SVUA as the best model, but if we don't involve commodity groups it won't be seen as good public policy when and if it is implemented. I don't think the proposed "third model" was palatable to most people in that room, but it makes for good public policy to talk about it to at least recognize why it doesn't work.

Germination: It seems like you want to go the extra mile to involve the commodity groups who put that proposal forward.

DC: For commodity groups, this whole value creation file is moving too fast. For us it's moving too slow. Talking about it helps everyone feel like they're involved in the same conversation. Challenging each other is how you build respect and foster strong working relationships. That's what leaders do is make judgement calls. It's about brand and reputation management. We heard support for the trailing contract model at that meeting from the likes of Gunter Jochum and Laurie Wakefield, which was huge. For a farmer and a seed grower to get onboard and publicly voice support for the trailing royalty/SVUA model was a heck of a step toward moving forward.

Germination: I suppose that's how you make change, by building relationships and getting everyone around the table.

DC: My hope is that stakeholders will now want to spend time on policy and regulatory pain points so my staff and I can get to work on addressing those irritants — and so our members can spend more of their time focusing and growing their core businesses, wherever they fall in the seed sector spectrum. ■

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PREPARING FOR MEMBER ENGAGEMENTS AHEAD

Caroline Lafontaine, CSGA Communications and Member Services Director

THE CANADIAN SEED Growers' Association has long recognized the importance of engaging members to help inform its position on industry issues, improve association values, develop policies and set our strategic focus.

More than ever, we are encouraging our members to engage and participate in the discussion on a National Seed Organization (NSO).

During the Interprovincial Seed Growers' Meeting this November in Saskatoon, seed growers will hear presentations by StrategyCorp, a consulting advisory firm, which will include proposals for the governance and organizational structure of a NSO.

The meeting will include a two-hour CSGA Special Member Meeting on Nov. 20 to seek member support on CSGA board positions.

For those who cannot participate in the Interprovincial meeting in Saskatoon, we encourage you to attend your local provincial seed grower branch meeting this winter to hear the presentations and have an opportunity to provide feedback on the proposal for the NSO.

Did you Know? Our 2019 interprovincial meeting on Nov. 20 will include a two-hour Special Member Meeting to seek member support on several CSGA board positions

"MEMBERS UNDERSTAND THE ISSUES BEST BECAUSE THEY ARE PART OF THE COMMUNITY MOST AFFECTED BY THE PROBLEMS AT HAND."

Combined, these meetings will represent a "grassroots rollout" of these proposals to build a NSO for our country. Based on feedback from these engagements, the CSGA board will decide whether CSGA and the seed industry are on the right path or whether adjustments are required.

Much credit is due to our president Jonathan Nyborg and our provincial boards, which are represented by Roy Klym who sits on the Seed Synergy Oversight Committee. They have helped to guide CSGA in moving forward with NSO discussions and ensuring members from across the country have their voices heard.

More than ever, we need our members to let us know what their vision of the future looks like, for both the association and the industry as a whole, and whether the soon-to-be-released proposal meets that vision.

Member engagement in this discussion is important because positive change rarely occurs or endures if it comes from the top-down.

Members understand the issues best because they are part of the community most affected by the problems at hand. Having members attend these branch meetings to hear the presentations, provide feedback, and engage in fruitful discussions on this proposal will help ensure we get it right.

Members are encouraged to look out for the December issue of CSGA's magazine *Seed to Succeed* for articles detailing the NSO proposal, and should continue to look for updates and engagement opportunities on our website **seedgrowers.ca**, in our Seed Scoop newsletter and in this space in *Germination* as we move ahead with modernizing our industry for the future.

A full listing of upcoming provincial branch meetings is available at **seedgrowers.ca/calendar/seed-industry-important-dates/** ■

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CAN WHEAT SAVE THE WORLD?

The wheat genome is way more complex than the human genome — can we figure it out in time to feed a growing world population?

Marc Zienkiewicz

A HALF-CENTURY AGO, human beings took their first steps on the moon.

At first, it's hard to imagine what that has to do with wheat, but for attendees of the first International Wheat Congress held in Saskatoon, Sask. earlier this year, the connection was apt.

"I was 12 years old when that happened. Being a young child and seeing this on a small black-and-white TV was impressive. Two men walked on the moon, but the fact is, the moon landing was the result of 500,000 people working together," said Martin Kropff, director-general of the International Maize and Wheat Improvement Center (CIMMYT), who spoke on the opening day of the congress.

"If we can put a man on the moon, we can solve 800 million people going to bed hungry every day. Wheat is a crucial part of that challenge."

Hosted by the University of Saskatchewan, the event brought together 900 researchers, agronomists and other scientists from 50 countries to talk about all things T. aestivum and T. turgidum.

The challenges ahead were the main focus as attendees zeroed in on the fact the world population is growing and more food is needed, specifically cereals — which Kropff said will comprise a third of all calories and protein in the human diet in the future.

But for food prices to remain constant, annual yield gains in wheat would have to increase from 1.2 to 1.7%.

"That's no small challenge," Kropff added.

Feeding the World Without Destroying It

As noted by Tim Searchinger, senior fellow at the World Resources Institute (WRI), the reality is that agriculture occupies half the world's vegetated land. That means for agriculture, the sheer task of feeding the world is a huge challenge for biodiversity and ecosystems — especially since agriculture produces a quarter of the world's greenhouse gas emissions.

Searchinger presented the WRI's recent report *Creating a Sustainable Food Future*, for which he was lead author. It is laid out as a five-course menu of solutions to ensure we can feed 10 billion people by 2050 without increasing emissions, fueling deforestation or exacerbating poverty.

Searchinger noted that between 2010 and 2050, food production must rise 56% in order to feed a growing population — and reduce greenhouse gas emissions by two-thirds in the process.

Wheat can play a huge role in that, he said.

According to the report, to provide continuing yield gains, breeding will need to become more nuanced.

"In the past, much yield gain in the major cereals like wheat resulted from shifting biomass from vegetative parts to seeds and shortening and stiffening of the stems so they could support more grain (resulting from higher fertilizer application) without falling over. These traits, which were largely responsible for the Green Revolution, are in some cases reaching their biological limits; crops can only grow so close to one another before they have no more space, and crops can only direct so much of their growth into edible portions before they will no longer stand upright," the report's authors state.

"These limits, plus the need to boost crop yields even faster than in historical trends, present the crop breeding challenge."

As a result, four major related opportunities exist to increase crop yields through improved breeding: speeding up crop breeding cycles, marker-assisted and genomics-assisted breeding, improvement of "orphan" crops, and genetic modification. Searchinger emphasized that all these technologies play a role in creating new wheat for the world.

"That's why we're here. The work you're doing is incredibly important," he said, and added that four recommendations to enable innovation in wheat include

The 1st International Wheat Congress (IWC) brought together 900 people from 50 countries. *Photo courtesy IWC*

boosting breeding budgets, sharing genomic advances, leveraging new technologies, and increasing research on orphan crops.

The Funding Challenge

According to the WRI report, the world probably devotes only around 1.4–1.7% of agricultural GDP to agricultural research and development, which is less than the rate of total research spending relative to the total global economy (2.1%).

Richard Gray, agricultural economist at the University of Saskatchewan, gave a talk titled "Successes and Failures in International Wheat Royalty Collection". He said strengthening plant breeders' rights through royalty collection is one way to ensure more stable funding for variety development, an initiative currently underway in Canada through an attempt to create a value creation system via either a trailing royalty or end-point royalty.

But there are challenges. According to Gray, UPOV 1991 Plant Breeders' Rights alone has generally failed to create a viable private wheat breeding industry.

"Producer support is an essential element of increased royalty collection and support has come where producers have some long-term ownership in wheat breeding programs," he said. "Public and producer partnerships have played an important role in providing additional breeding resources while enhancing knowledge sharing."

Bringing Researchers Together

This first IWC event was a merger of two previously parallel wheat symposia: the International Wheat Genetics Symposium that took place every five years and the

Martin Kropff, director-general of the International Maize and Wheat Improvement Center, spoke on the opening day of the congress.

International Wheat Conference held every four years. The two groups agreed to join their efforts to create IWC, said international organizing committee chair Hermann Bürstmayr.

"Wheat is in terms of acreage the largest crop on our globe. Wheat is needed for food, feed and materials in countless ways and wheat is a staple food for around two billion people, many of whom live in [developing] countries. Research has to play its role to deliver know-how, improved production tools and improved cultivars to make wheat production sustainable," he said.

"Challenges are plentiful, as they have always been. Certainly, the more erratic weather extremes will be an important issue, cultivars need possibly more resilience and buffering capacity than before. Heat stress is very likely to increase. Also, resource efficiency — particularly

nutrient efficiency, such as nitrogen and phosphorous efficiency — will gain more relevance. And wheat production is expanding into non-traditional areas, such as sub-Saharan Africa — which means production systems need to be established for these regions."

Creating a new generation of wheat that is tolerant to heat stress, drought stress, excess moisture and a constantly-evolving army of pests will require ongoing efforts to collaborate globally — which in many ways is already happening. University of Saskatchewan researchers — led by wheat breeder Curtis Pozniak who helmed the event's Canadian organizing committee — played a key role in mapping the wheat genome as part of an international consortium.

"The bread wheat genome is five times bigger than the human genome — it's a beast. The effort required to undertake cutting-edge research like wheat genome sequencing is massive," said Richard Cuthbert, wheat breeder at the Agriculture and Agri-Food Canada – Swift Current Research & Development Centre.

"There are over 110,000 genes in bread wheat. Employing new technologies like gene editing will depend on how we can dissect complex traits to identify the genes that underlie them and how those genes work together. We're standing on the cliff of the next frontier in wheat. Now that we know what the genes are, we need to know how they work and interact with each other."

Also during the event, Genome Canada announced an investment of $11.2 million to go toward some exciting new research spearheaded by Pozniak and fellow wheat researcher Sylvie Cloutier of Agriculture and Agri-Food Canada.

Known as 4D Wheat: Diversity, Domestication, Discovery and Delivery, this research will use wild-wheat relatives and elite germplasm along with industry-leading genomic techniques to better understand wheat's genetic potential. The study will also examine the economics and policies of using wild-wheat germplasm sources and germplasm from international sources.

Pozniak and Cloutier's work will be based out of the Crop Development Centre at the University of Saskatchewan and Agriculture and Agri-Food Canada's Ottawa Research & Development Centre. ■

WHERE ON THE WEB To download presentations from the 1st International Wheat Congress, visit **2019iwc.ca**

RESEARCH ROOTS RUN DEEP

As lead for roots-soil-microbiome research at the University of Saskatchewan, Leon Kochian is getting recognized for helping bolster global food security.

AS LEAD FOR the roots-soil-microbiome research area at the University of Saskatchewan Global Institute for Food Security (GIFS), Leon Kochian's work focuses on improving crop yields by understanding the interactions between roots, the soil they live in, and the micro-organisms in the soil.

His goal is to breed crops with healthier, more efficient root systems that can grow successfully in less fertile soils — it is work that has led to him be recognized with the 2019 Arrell Global Food Innovation Award for global excellence in food innovation.

"This award recognizes the kind of scientific excellence that is needed more than ever to overcome the daunting global challenge of feeding 9.7-billion people by 2050," said Karen Chad, USask vice-president research.

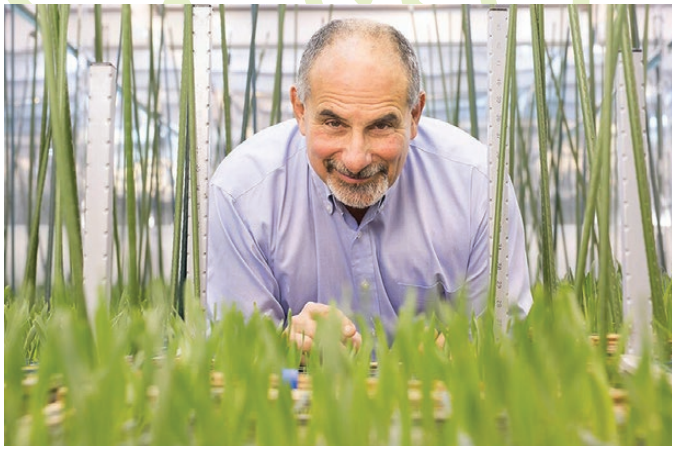
"With Leon Kochian's research pre-eminence and leadership, supported by the Global Institute for Food Security and our dynamic food security research cluster, we are poised to provide transformative and sustainable research solutions to help feed a growing world."

Kochian, associate director of the GIFS and a faculty member in the USask plant sciences and soil science departments of the College of Agriculture and Bioresources, is internationally recognized for cutting-edge plant root systems research that aims to improve crop yields.

He joined USask in 2016 from Cornell University and the U.S. Department of Agriculture to lead the USask CERC program aimed at improving global food production.

Kochian's team uses the Canadian Light Source, a national research facility of USask, and other state-of-the-art imaging tools, along with the latest computer technology, to digitize desired crop traits and link them to specific genes in a searchable database. This innovative approach enables tailored design and breeding of root systems to specific agro-environments for crops including wheat, barley, lentils and canola.

"Saskatchewan is attracting global attention in food security research at its world-class institutes, helping to solve the challenge of feeding a growing world," said Kochian. "I appreciate this award from the Arrell Food Institute and recognize the support and contributions of my colleagues to this work."



Leon Kochian is the Canada Excellence Research Chair in Global Food Security and associate director, Global Institute for Food Security at the University of Saskatchewan. *Photo courtesy USask*

One of the world's most highly-cited scientific researchers, Kochian has been elected to the Agricultural Research Service Hall of Fame and was included on the Thomson Reuters' 2018 list of the World's Most Influential Scientific Research Minds.

"Dr. Kochian is the kind of scientific innovator the world needs to meet the great challenges of the 21st century to ensure a safe, sustainable and healthy system for everyone," said Evan Fraser, director of the Arrell Food Institute. "We hope his leadership in the research space inspires many others to take on these food security problems."

The award ceremony will be held Dec. 3, 2019, at the Arrell Food Summit in Toronto. Kochian will be featured on a panel discussing strategies needed to develop food systems to feed the world's growing population in a sustainable, healthy and equitable way. *Source: USask* ■

A NEW TOOL HELPING YOU IN THE REALM OF RETAIL SEED SALES.

RETAIL ROUNDTABLE

BUILDING TOMORROW'S SEED INDUSTRY TODAY

How do we build a single national seed organization? Some experts provide key insights.

Marc Zienkiewicz

Todd Hyra
Canadian Seed Trade Association Rep
Seed Synergy Oversight Committee
As western business manager for SeCan, Todd develops new business opportunities for SeCan members and industry partners. He is also a past-president of the Canadian Seed Trade Association.

Todd, there's been a lot of talk about Seed Synergy these past few years. Can you give us a quick snapshot of what is happening here?
It's important to think of Seed Synergy as a process rather than a thing. One of its major goals is a new national seed organization that will amalgamate five of the six current players in the industry — the Canadian Seed Growers' Association, Canadian Seed Trade Association, Canadian Seed Institute, Commercial Seed Analysts Association of Canada and Canadian Plant Technology Agency. The goal is a better, more efficient system to serve the entire industry — whether you are large or small, a grower, processor, developer and ultimately our farm customers and end users. We need to build something to position us for the future.

Why are we doing this now?
There's a regulatory opportunity that allows us to change how we do things. When we look at the government regulatory review happening in 2020 and 2021, we want to ensure we have a system in place to adapt to what government wants to do. In terms of what government can provide to industry, we're not going to be provided with any more. As we look at those resources and how we govern ourselves, it's crucial to use those resources effectively and be proactive in filling those gaps so we can be proactive and not reactive.

What has the government's response been so far?
From the beginning, we described this as industry-led and government-enabled. We check in with Agriculture and Agri-Food Canada and the Canadian Food Inspection Agency at each step to ensure they are on the same page. They have given us the thumbs-up to keep moving forward and encourage us to continue to flesh out the new organization.

What will the budgetary requirements of this new organization look like?
We're working through that now — what membership structure might look like, costs, that sort of thing. The ultimate goal is to make sure we add value, not costs.

How will provincial seed growers fit into this new organization?
We'll be fleshing out that structure over the next few months, but there's great support for having provincial outreach within the new organization. Having that two-way information flow strengthens the new entity. There's strong support for maintaining a provincial-type system to ensure involvement by grassroots members.

Will the new organization have a single, central office location?
The goal is to have one entity. In terms of offices, it's too early to tell what that will look like. That will be sorted out within the next year. The important thing is to build a governance structure that works. Staffing requirements will follow.

David Hansen
CropLife Canada Rep
Seed Synergy Oversight Committee
Dave joined Canterra Seeds as CEO in October of 2009 and was shortly thereafter appointed president. He is an industry veteran with experience working in Canada and internationally. In 2018 he was selected as one of Germination's Top 20 Influencers in the Canadian seed industry.

"WE HAVE LOTS OF HISTORY AND LEGACY TIED UP IN THESE FIVE ASSOCIATIONS, AND THAT MEANS WE HAVE A LOT OF PROUD PEOPLE AROUND THE TABLE."
–Tom Greaves

Some argue things are fine the way they are with the current makeup of our industry. How do you respond to that?
We can say things are going fine, but we need to think about the future and what it holds for us as an industry. Bringing one single voice to the table to deal with many of the issues facing our industry, we're much better under one umbrella than on an individual basis. We are working in a global economy and we need to ensure as an industry we remain competitive and attractive as it relates to investment.

What's the oversight committee's guiding philosophy when it comes to designing the new organization?
Ultimately, when we create a new organization, we look at what the net benefits are for members. If you think about improving member services, we can consider issues around regulatory matters, intellectual property protection, advocacy, support functions, communications and training — all those necessary functions. We also need to think about the number of hours and effort that go into running these individual organizations. We have skilled and competent staffing today, but a lot of the heavy lifting is reliant on membership and volunteer time. That becomes very taxing on people's time with the extreme overlap we have with some of these organizations.

What are the primary considerations with regard to the benefits for the main stakeholders?
We're looking at where the value and benefits lie for the plant breeders creating new varieties.

We can see it's going to take a concerted effort to ensure we as an industry are aligned in being able to lobby for the rights of breeders, and that would be a huge benefit a single organization will bring to the table.

From a seed grower's perspective, their focus is on making sure they have the right varieties in the right place at the right time. We want to make sure they have the tools available to expedite their business through modernized and streamlined production systems and standards. Certification processes need to be timely and done with the right vigour. They also want to ensure they have access to the most innovative varieties that will create value for their own farm operations. That's what we're all in business for — to service that end user.

As far as labs and inspectors go— people who help monitor everything with relation to quality assurance — working together with the entire value chain and seed industry means we can all get and have what we need to facilitate that whole process. Working under one umbrella will help that.

The Seed Synergy White Paper is done. What are the next steps?
We have contracted the services of StrategyCorp to help facilitate the creation of this new system that we're building. They've got a very aggressive mandate to see this through. We are hoping to have this in final draft form by July 2020. A lot of work and communication has to be done across the country with all members engaging. We will build on the mandate that has been created through the evolution of the White Paper — that is going to be the framework of what we're building. Even once we reach July 2020, somewhere along the line we will start transitioning from the five entities into one and make this as seamless as possible.

How could having just one organization affect our country's relationship with other seed orgs? For example, CSTA works very well with the American Seed Trade Association. How can one organization keep those close working connections?
I think one organization enhances our ability to work with the global seed industry, like the International Seed Federation, for example. When we can go to them with one solid voice, it will mean an awful lot more to the benefit of our farmers and seed growers, as opposed to having a conversation that's fractured.

"THE ULTIMATE GOAL IS TO MAKE SURE WE ADD VALUE, NOT COSTS."
–Todd Hyra

Tom Greaves
President, Pitura Seeds
Tom obtained his diploma in agriculture at the University of Manitoba in 2001. With many years of experience in the agriculture field, he has held roles in quality control and plant management.

Eric McLean
Seed grower and retailer
Eric is a seed grower and retailer in Oak River, Man., and operates J.S. Henry & Son Ltd. He describes himself as a husband, father, brother, son, farmer, businessman, and proud seed grower for many farmers in western Manitoba.

As a grower and retailer, how will a single national seed organization benefit you?

TOM GREAVES (TG): It really does get rid of the overlap. As a seed grower I belong to CSGA and as a retailer I belong to CSTA. We face the same challenges, so bringing us together makes sense.

ERIC MCLEAN (EM): The biggest thing is industry cooperation. I look at this from a grassroots perspective. It will hopefully lead to reduced operating costs and increasing funds available to advance seed industry initiatives. Having a joint annual meeting between CSGA and CSTA, for example — by doing that, we bring a broad section of people together to solve issues and have everyone in the room at the same time, so we don't have to guess what others are thinking.

What are the biggest challenges you see us having in building the national organization and how can we overcome them?

EM: There's a sentiment of "us versus them". How will we do it, who will run it? It can be scary, which is natural when you build something new, but at the end of the day we have to keep fighting that fear and moving forward like we are doing.

TG: We have lots of history and legacy tied up in these five associations, and that means we have a lot of proud people around the table. Thing is, pride can sometimes make us resistant to change. I believe we have the right people around the table and most people can see the net benefit at the end of the day. We need to be focused and flexible as a group in building this.

Can you think of an example you've seen that made you feel encouraged that a single national organization will become a reality?

TG: It hit home for me this year when we were at the national meeting in Whistler, B.C., having the gala dinner night with everyone in the same room. There were 500 people together and everyone had the same goal of bringing the industry together and moving it forward. It was so gratifying to see 500 people with the same goals moving in the same direction.

EM: I agree with Tom. To be able to have a venue to bring everyone together like that, that's how our associations began in the first place. A few years ago, CSGA and CSTA held their annual meetings separately. It's so nice when the meetings are held together, you bump into colleagues and really get a sense of community. The more time we spend together like that, the more a single national organization makes sense. ■

WHERE ON THE WEB
Watch our entire Retail Roundtable webinar on this topic! Visit **germination.ca/how-do-we-build-a-single-national-seed-organization/**

THREE WORDS TO REMEMBER IN 2020

Morgan Webb of Seed Check offers up an easy-to-remember strategy for ensuring 2019's wacky weather poses minimal risk to your plans in 2020. Marc Zienkiewicz

ONCE AGAIN, 2019 had it all in terms of weather.

The southern parts of Alberta and Saskatchewan experienced dry conditions. The northern part of the Prairies saw too much moisture, especially during the end of September.

What are growers to do with this sort of unpredictability?

According to Morgan Webb of the Alberta-based Seed Check, two things.

The first: get used to it.

Webb says this sort of unpredictable weather is only becoming more common.

"It's a trend that's affecting everyone. Wet harvests are becoming more common," he says. "A wet harvest will cause issues with storability, dormancy, vigour problems and fungal problems. Or, we are seeing the opposite — wet springs. What happens with a wet spring is you end up with a shortened growing season. You open yourself up to more frost damage and things not maturing properly, which also affects seed vigour."

The second thing you can do? Use three seed testing tools to help mitigate the effects of extreme weather events.

Webb says to commit these three words to memory: **disease, vigour** and **germination.**

"Those are three tests I'd get right now before the 2020 season even begins," he says.

Here's a rundown of these three tests and what they offer.

Disease

The object of seed pathology testing is to determine the health of the seed lot for use in planting. Plant diseases are known to greatly reduce yield. Not all plant diseases are contained

in or on seed, but it is important to know if you have one or more that are. Seed may contain plant pathogens or agents that cause disease in plants. These diseases may affect storage, vigour, germination, market availability, harvest yield, seed appearance, or contain toxins.

Plant pathogens include fungus, bacteria, viruses, and nematodes. When you plant infected seed you distribute these evenly throughout your land. It is important to know what level of these you may have. When levels of disease are high it may be important to seek out a different source of seed for planting. It also may be very helpful in choosing a seed treatment. Most importantly is to not introduce plant diseases you do not already have. Many of these can persist in soil or on trash and become a problem for many years.

"Best of all, if your seed is free of disease, you don't have to re-test it for disease in the spring," Webb adds.

Vigour

Vigour is a way to tell how seedlots of similar germination compare when conditions are not favourable, which lots will retain their potential after storage, which lots will come out of the ground uniformly, and which ones will establish a good stand of plants in the field.

There are a number of vigour tests including the tetrazolium test and the accelerated aging test.

"A vigour test can predict storability, because vigour drops off before germination does," Webb says.

Germination

The object of germination testing is to determine the maximum germination potential of the seed. Laboratory methods have evolved in which controlled conditions are used to give rapid and complete germination for the majority of samples of a particular species.

Seed germination in seed laboratory practice is defined as the emergence and development from the seed embryo those essential structures which are indicative of the ability to produce a useful, mature plant under favourable field conditions.

The seed analyst plants pure seed under prescribed conditions for the species being tested. The seeds are incubated for the prescribed period of time before the seed analyst evaluates the test.

Webb recommends performing a thousand-kernel weight test after the seed has been cleaned. This can help you determine your ideal seeding rate which will allow you to get the most out of your seed come spring of 2020.

For more info visit **seedcheck.net**! ■

WHAT DO YOU NEED TO DO TO IMPORT HEMP SEED? A LOT!

Roy van Wyk, CSI Executive Director

CANADA RECENTLY MARKED a year since the legalization of recreational cannabis. We get a lot of questions these days concerning importation of hemp seed. Is hemp the same as cannabis? Do the same rules apply to both crops? What are the rules, exactly?

Industrial hemp and cannabis — while they are technically the same plant species — differ due to their intended uses and their THC content. THC is, of course, the naturally-occurring substance contained in cannabis that has a psychoactive effect when consumed for medical or recreational purposes.

The Cannabis Act and its regulations provide a legal framework for the possession, production, distribution and sale of cannabis in Canada. Cannabis with greater than 0.3% THC is known as cannabis. Cannabis with less than 0.3% THC is referred to as industrial hemp.

The Industrial Hemp Regulations (under the Cannabis Act) set out the regulatory framework for controlling and authorizing certain activities with industrial hemp. Under this framework, a person is required to obtain a licence issued by Health Canada in order to conduct various activities with industrial hemp.

An industrial hemp licence is required to cultivate, sell, import, export, clean, condition and process hemp.

Now that the cannabidiol (CBD) craze is in full swing, we are getting more questions about how to import industrial hemp seed.

There are a number of things you need to know. To import hemp seed, a person or company needs:

- An industrial hemp licence from Health Canada that includes importation
- An import permit for each shipment imported

Seed must be of pedigreed status and of an approved cultivar, or in the case of a plant breeder, seed must be of a variety of industrial hemp that is set out in the breeder's industrial hemp licence.

Did you know?
Hemp and cannabis are the same plant species, with a crucial difference: hemp is low in THC.

> "AS MORE BUSINESSES SEEK TO ENTER THE HEMP MARKET, IT'S CRUCIAL TO BE UP-TO-DATE ON IMPORT REQUIREMENTS."

The importer must also disclose a number of details about the imported material within 20 days of import. The list is extensive and includes:

- The importer's name, the number of the licence that authorizes the importation and the import permit number issued in respect of the shipment;
- The date of release of the shipment;
- The quantity, in kilograms, of each form imported, and

— if the shipment consists of seed — documents establishing that fact the seed is of pedigreed status that is of an approved cultivar, and;

- In the case of a plant breeder, the seed is of a variety of industrial hemp set out in their licence or the germplasm is the one whose name or number is set out in their licence.
- In the case of a plant breeder, the seed is of a variety of industrial hemp set out in their licence or the germplasm is the one whose name or number is set out in their licence.

There are numerous requirements and they must be followed stringently to avoid complications. A number of resources are available online including the Industrial Hemp Licensing Application Guide which is easily accessible via Google.

As more businesses seek to enter the hemp market, it's crucial to be up-to-date on import requirements. Contact me at rvanwyk@csi-ics.com or Jennifer Scott at jscott@csi-ics.com to discuss! ■

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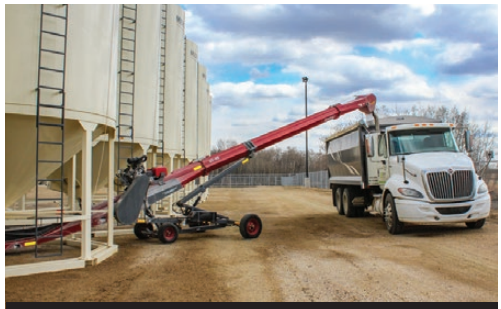

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Wheat breeder Alireza Navabi taught multiple undergraduate and graduate courses as well as advising 12 graduate students. He sat on over 25 graduate advisory committees.

PLANT BREEDER, MENTOR, FRIEND

Students and faculty at the University of Guelph say Ali Navabi will be remembered for his innovative approach to research and care for his students' wellbeing. Marc Zienkiewicz

THE PLANT BREEDING community at the University of Guelph is remembering an influential mentor and researcher as someone who cared deeply about people and never lost sight of the humanity involved in taking a proper approach to research.

Alireza (Ali) Navabi — originally from Iran where he did his undergraduate studies — was a wheat breeder and professor in the university's Department of Plant Agriculture. He passed away earlier this year after a battle with pancreatic cancer at the age of 53.

A loving husband and devoted father of two boys, he first joined the department in 2008 as an adjunct professor and since 2014 held the Grain Farmers of Ontario (GFO) Professorship in Wheat Breeding.

Among his many accomplishments was his building of the wheat breeding program at the University of Guelph and developing its first winter wheat variety OAC Galaxy, soon to be released.

A number of other wheat lines in the pipeline from his program are reaching the final stages of testing.

He also developed a speed breeding method that can produce 3.2 generations per year.

"That's extremely fast. The method was developed originally in Australia but he used his resourcefulness to adopt and adapt it for the University of Guelph," says Navabi's colleague and friend Istvan Rajcan, a plant breeder at the university.

"He built a strong and dynamic multifaceted breeding program in a very short time. He obtained germplasm from various sources and started doing breeding right away when he started as a faculty member. He had a multitude of projects funded from many sources, including the seed industry. He was known as an amazing

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Peter Pauls says Navabi cared a lot about his students, and they spent many hours in his office where he would discuss their projects with them and make sure they were doing well.

Navabi's colleague Istvan Rajcan says Navabi had an ability to put students at ease and help them work through their struggles.

Harwinder Sidhu (right) was a student involved in Navabi's wheat breeding program.

grant writer. It was actually very rare for one of his grant applications to be turned down."

Navabi taught multiple undergraduate and graduate courses as well as advising 12 graduate students. He sat on over 25 graduate advisory committees.

"He was very dedicated to his research but also knew that working at a university meant teaching is an important part of your responsibilities. He cared a lot about the students, and they spent many hours in his office where he would discuss their projects with them and make sure they were doing well," says Peter Pauls, a University of Guelph plant breeder and colleague of Navabi's.

"I think he had a very clear vision of how one could go about working at the whole plant breeding enterprise in a way that made it fun and relaxed."

Rajcan agrees that Navabi had an ability to put students at ease and help them work through their struggles. His office was located next to Navabi's — which gave him unique insight into Navabi as a mentor for his students.

"He had a huge heart and patience for everyone in terms of listening to them and supporting them. He'd talk to a student until they got to a better place if they were stressed or overwhelmed. They always left his office better off than when they arrived. Being in the neighbouring office, I had the pleasure of witnessing that many, many times."

Harwinder Sidhu was one of those students. He was a graduate student of Navabi's and worked with him for over four years and is still part of the wheat breeding program at the university.

"He was always there to help others. One of my family members was going through a tough time once and Ali tried to help even when he had no obligation to do so. This was a few months after I had started to work with him. That established in my mind the kind of character he had, and I really looked up to him for that," Sidhu says.

"He organized the Christmas party in 2017 for the department. He ensured that there was music for everyone in every language and culture to which the attendees belonged. Even the people who considered themselves introverts got up and danced. That's just one example of how he always tried to make everyone around him feel at ease and comfortable."

Soren Seifi joined Navabi's lab in June 2017 as a postdoctoral fellow. He remembers Navabi as someone who incorporated creativity into his work — something more often associated with the arts than the sciences.

"When I started my postdoc project I expected a certain type of outcome from the initial experiments. However, the results were totally different from what we expected. I personally thought — at the time I did not know him very well — that I had messed the things up and he would be disappointed. To my surprise, he actually appreciated the unexpected outcome, and asked me to focus on those 'strange' results and work on them and he assured me that he trusted the quality of my work," Seifi says.

"His support and trust gave me enough confidence to continue my analyses, and after a while I was able to find

Mina Kaviani, another of Navabi's protégés, said his research served a multifaceted function in his life.

Soren Seifi joined Navabi's lab in June 2017 as a postdoctoral fellow. He remembers Navabi as someone who incorporated creativity into his work.

convincing answers for those unexpected observations, which led us to very promising and novel findings that are now a solid foundation for a nice research publication."

Navabi himself published his own fair share of research — 65 peer-reviewed papers and 30 variety disclosures, to be exact. He also gave over 100 conference presentations both nationally and internationally.

According to Mina Kaviani, another of Navabi's protégés, his research served a multifaceted function in his life.

"I think scientific research was a great way for him to make friends. He loved science and was great at it, but he had an even greater heart," she says. "Of course, we miss him, but I don't feel he's gone. His kindness and wisdom lit a little flame inside each one of us who worked with him. I'm sure I will come across many situations where making decision is hard, and I will simply ask myself: what would Dr. Navabi do?" ■

JOURNEY OF DISCOVERY

What do a derelict Iranian palace and miles of Kuwaiti desert have in common? They play a key role in the history of 20/20 Seed Labs and the career of its founder. Marc Zienkiewicz

THE STORY OF Sarah Foster's career and the founding of her company 20/20 Seed Labs plays out like a Hollywood movie. The plot would go something like this.

It's the 1960s, and a young British girl moves with her family from the U.K. to Iran because her civil engineer father has found work there. The little girl befriends an elderly gardener who lives with his family in an abandoned palace next door. Through helping him garden she discovers her love of plants and goes on to a successful career as a seed analyst and entrepreneur.

The film's twist would come when the 1991 Gulf War takes place, and the Kuwaiti government must reclaim vast swaths of desert contaminated by oil fields set on fire by Iraqi dictator Saddam Hussein. Our protagonist and her business partners are hired on to help in one of the biggest land reclamation efforts in history.

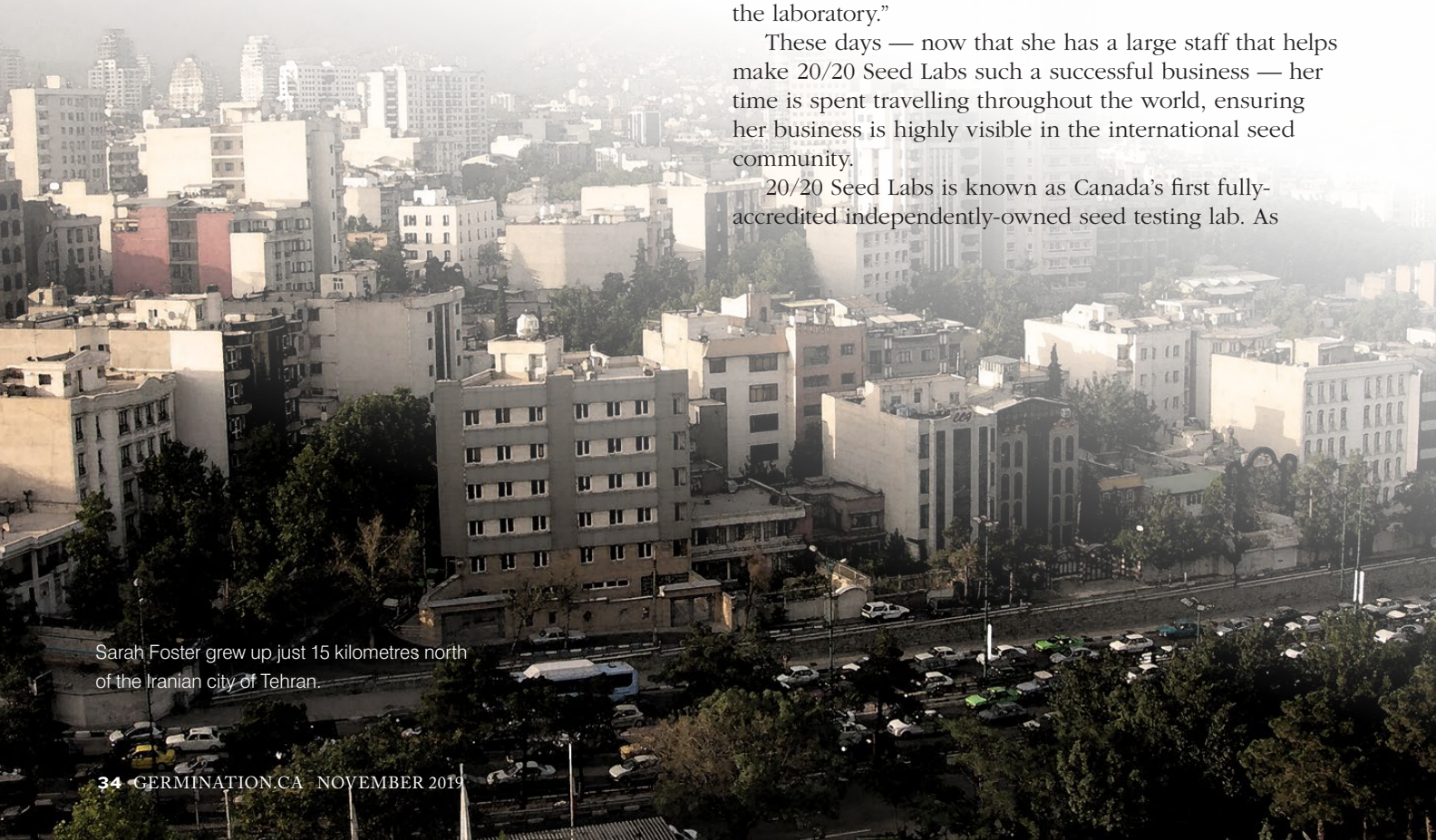
Everything about the story is true, of course. Foster — the 57-year-old founder of 20/20 Seed Labs which is celebrating its 30th anniversary 2019 — has lived a life that would indeed make a great transition to the silver screen.

"I wanted to do something different with my life, especially in seed, and I wanted the freedom to bring useful technology to the agricultural sector. I think it takes a certain kind of person to be an entrepreneur, and there aren't many of us out there that can say they are doing something they love," she says.

"When I started the seed testing laboratory, I think it was rare for analysts to be seen at meetings. People told me they thought I was different. I would look at them puzzled. They pictured seed analysts as women with bouffant hairdos, chained to their desks and never leaving the laboratory."

These days — now that she has a large staff that helps make 20/20 Seed Labs such a successful business — her time is spent travelling throughout the world, ensuring her business is highly visible in the international seed community.

20/20 Seed Labs is known as Canada's first fully-accredited independently-owned seed testing lab. As



Sarah Foster grew up just 15 kilometres north of the Iranian city of Tehran.

leader of the company, Foster and her team have received multiple awards including the 2004 Alberta Premier's Award of Excellence, the 2013 Canadian Seed Trade Association Outstanding Achievement Award and the 2018 Alberta Seed Processors Outstanding Service Award.

In 2019, Foster herself was named a top Alberta business leader by Business in Edmonton and Calgary.

"I think being successful in this business requires being a good leader, an excellent listener and mentor. In my early days I didn't think about leadership, especially when I was in the thick of purity and germination testing. In the beginning I thought a lot about getting new clients and business to support our staff — running the lab was always left to other staff members. We were growing so fast in the beginning I had very little time to mentor people. That's changed now, and I'm very grateful to have a strong team that make things easier," she says.

Foster founded 20/20 Seed Labs in 1989 shortly after the federal government privatized seed testing in Canada. At the time, she was employed by a seed and grain company that had no plans to expand its laboratory services. Not satisfied with her career, Foster wanted to explore the opportunity of offering a broader range of services.

The company quickly expanded as it became better known, largely through the presence of its head office in Nisku, Alta., word-of-mouth and Foster's attendance at virtually every industry meeting — "pounding the pavement", as Foster's business partner and 20/20 Seed Labs operations manager Carey Matthiessen likes to say.

"In 2013, we decided to open a laboratory in Winnipeg to mirror our operations in Nisku. Sarah's drive to succeed and willingness to sacrifice led her to live part-time in Winnipeg and part-time in Edmonton to ensure the success of both organizations. She worked tirelessly to build a customer base there, ensuring that our new customers in Winnipeg would receive the same service delivery that they receive at the head office," Matthiessen says.

"Now our Winnipeg laboratory continues to grow year-over-year and we are expanding into new markets with new technologies, thanks in no small part to Sarah's vision."

For Foster, that vision expands further than just her Canadian operations. She frequently travels to South America where 20/20 conducts business and she also serves as an auditor for the International Seed Testing Association (ISTA), travelling the globe to help other seed labs get in line with international seed testing standards.

According to Florina Palada, ISTA's head of accreditation and technical department, Foster shines due to her ability to relate to others in different parts of the world.

"Sarah is so easy to talk to, open to sharing and to receiving information. Despite the fact that she is so busy with her work and her life in general, she finds time to dedicate to being an ISTA technical auditor, which is no small task," Palada says. "We call ISTA a family and Sarah is definitely one of those family members."

Foster says she learned the importance of face-to-face relationships the old-fashioned way.

"When I started out, there was no internet. Today you can find someone anywhere in the world and get the answers almost instantly. In those days, that was unfathomable. You made a point of going to see people face-to-face — relationships were special," she says.

Relationships are what stand out most for her after all these years of being involved in agriculture.

When her father moved the family from the U.K. to Iran when she was a little girl, she learned quickly how agriculture brings people together. That's when she met the gardener who taught her the beauty of growing plants. Foster and her family lived just 15 kilometres north of Tehran in the foothills of the Alborz mountain range.

Sarah Foster founded 20/20 Seed Labs in 1989 shortly after the federal government privatized seed testing in Canada. *Photo: Rebecca Lippiatt*

"There was a derelict palace next door to where we lived, and this family lived in the one room that hadn't fallen down yet. They looked after the immediate grounds around the palace. The father did most of the gardening. He must have had four or five acres he tended to himself and I was out there every day after school helping him," she says.

"He grew tomatoes, cucumbers and a variety of melons which were all channel irrigated. He taught me how to channel and open up the water so it would flow to the plants, and just how to grow things in general. Seeing those vegetables appear out of seemingly nowhere was fascinating. When I was 14 we moved back to the U.K. My family settled in Lincolnshire — the heart of agriculture — which was fortunate for me being so interested in it. I was always eager to learn more from as many other people as I could in the farming community."

Sarah Foster and the staff of 20/20 Seed Labs are celebrating the company's 30th anniversary in 2019. *Photo: Rebecca Lippiatt*

That sense of camaraderie has helped both Foster and 20/20 Seed Labs find new opportunities where they least expect. Foster and her business partner, 20/20 Seed Labs business development manager Kevin Zaychuk, have travelled to Kuwait after 20/20 Seed Labs was hired in 2013 to assist the Kuwait Ministry of Agriculture in reclaiming its natural habitat after the Gulf War.

"There were miles of desert which were affected by the Gulf War oil field fires under Saddam Hussein's dictatorship. That created a massive spill and contamination which later threatened the delicate plant species. The Kuwait ministry were compensated $4.8 billion by the United Nations to reclaim and clean up the land over the next 20 years. I was attending an ISTA meeting in Turkey around that time, and I was told that the Kuwait Ministry of Agriculture was looking for help with this reclamation work. The scope of the project was fascinating, particularly working with rare plants that are key specimens in the desert," Foster says.

"Having grown up in Iran I knew a lot about the Middle East. I love it there. It's changed a lot over the years and will change again, but it will always have a special place in my heart."

As does her business and the people she works with. 20/20 Seed Labs recognizes the importance of organizations giving back to the community in which it resides — in Leduc County, the organization regularly contributes to the Leduc Food Bank by employees volunteering to cook or serve in their kitchen, through financial contributions generated by employee bake sales and silent auctions, and clients donating peas, lentils and beans for their soup recipes.

The lab and office is opened to the public and clients several times throughout the year including Canada's National Agriculture Day. This provides a platform to celebrate agriculture and communicate the benefits of new technology in the industry. As an example, 20/20 offered complimentary testing (over $500,000) to its clients when fusarium was first detected in Alberta.

All of the company's employees, regardless of their agricultural background, are given the opportunity to further their education and are also encouraged to attend industry meetings associated with their area of expertise. All employees are covered to become accredited in their area of specialization and are encouraged to become involved with related organizations.

Business-wise, Foster says the company is exploring new territory with the Spornado sampler. This unit is a passive spore catcher designed to capture airborne pathogens of economic importance.

"We're also expanding our vigour testing so we are adding more growth chambers to accommodate these tests, and of course always conducting lots of research," she says.

"We always have our sights on future technology and we're very aware of advanced methodologies which are now introduced faster than ever. The change I've seen in 30 years is incredible, but what seed testing will look like in another three decades will be even more unbelievable." ■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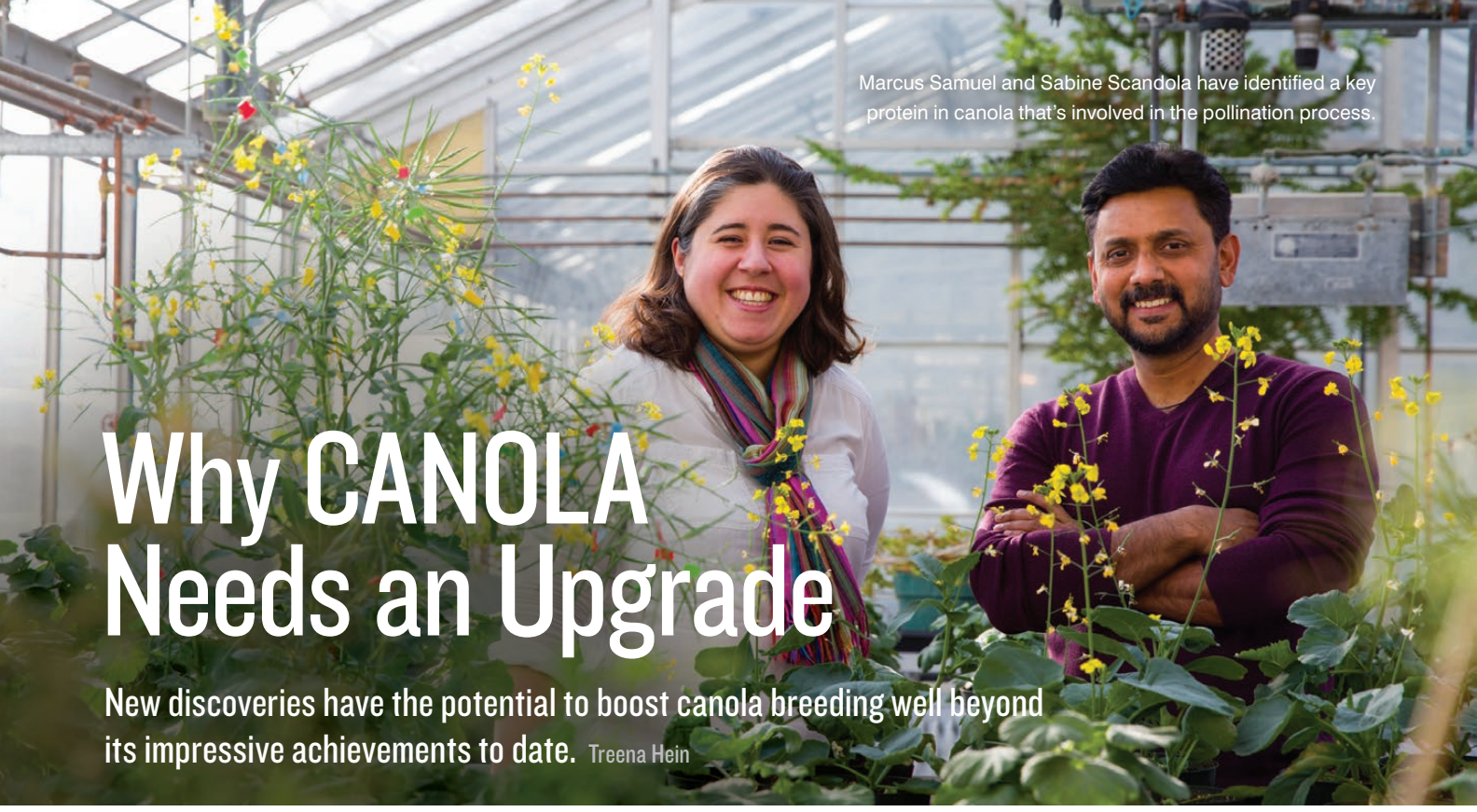

Marcus Samuel and Sabine Scandola have identified a key protein in canola that's involved in the pollination process.

Why CANOLA Needs an Upgrade

New discoveries have the potential to boost canola breeding well beyond its impressive achievements to date. Treena Hein

IN LIGHT OF the ongoing trade dispute with China, it's important to note that canola is an undisputed Canadian success story. Many across the agriculture world would consider what has already been achieved in breeding canola traits related to crop production and end uses as legendary.

But canola's story is far from over, and that's thanks to some new biochemistry research developments.

In fact, according to Marcus Samuel, an associate professor and director of the BiSci Greenhouse at the University of Calgary, without new science, canola yields will remain stagnant.

"We have currently reached the maximum potential of the existing technology," he explains. "Major discoveries and translation [of these discoveries into breeding] are required to further increase the yield potential or sustain yield under challenging conditions."

Martin Mau, a post-doctoral fellow in the department of Seed and Developmental Biology at the Global Institute for Food Security at the University of Saskatchewan, also points to yield stagnation as an issue.

"Utilizing the methods established during the Green Revolution of the 1960s for many decades now, the last 10 years showed a drastic drop in the genetic diversity — and missing progress in grain yield growth — among the major crop plants such as wheat, rice, maize and canola due to the breeding focus on herbicide resistance and yield," he says.

"Just 15 crops provide roughly 90% of the world's food, and those face a genetic bottleneck, making them very vulnerable for pandemic pests. On the other hand, the world population is steadily growing. Now we need another agricultural revolution — or some say an evolution — which means the development of disruptive, groundbreaking methods in order to avoid genetic bottlenecks in our crop plants and [to achieve] improvement of the genetic gain in grain yield."

Mau says two main crop science research avenues have been the focus during the last few years, one being so-called "Gene Bank 2.0" projects around the world.

These involve digitizing (inputting data into storage for later access/sharing) the genetic and phenotypic information in germplasm collections.

This will lead to improved breeding strategies by enabling better prediction models of trait heritability rates, as well as the incorporation of wild and land races, and the screening of cultivar genetics.

The other main research avenue is the development of "molecular toolkits" such as the apomixis (a form of asexual seed production) into classic breeding schemes.

Taking Sex out of the Equation

Mau and his team have successfully demonstrated the transfer of apomixis into a model plant, and they have received $625,000 from Saskatchewan's Agriculture Development Fund to proceed with doing the same in canola.

Apomixis, explains Mau, is a female trait that results in all progeny of a plant being clones of their mother. So, while apomixis does not have an influence on what specific traits are bred, he says, it allows their fixation in future generations.

It also allows for the combination of novel traits (e.g. from wild accessions or land races) with traits from elite cultivars without losing a plant's basic trait set.

Canola happens to be a crop that's threatened by various diseases (blackleg, clubroot, downy mildew) and it's been difficult, up to this point, to breed a single variety resistant to all of them. Incorporating

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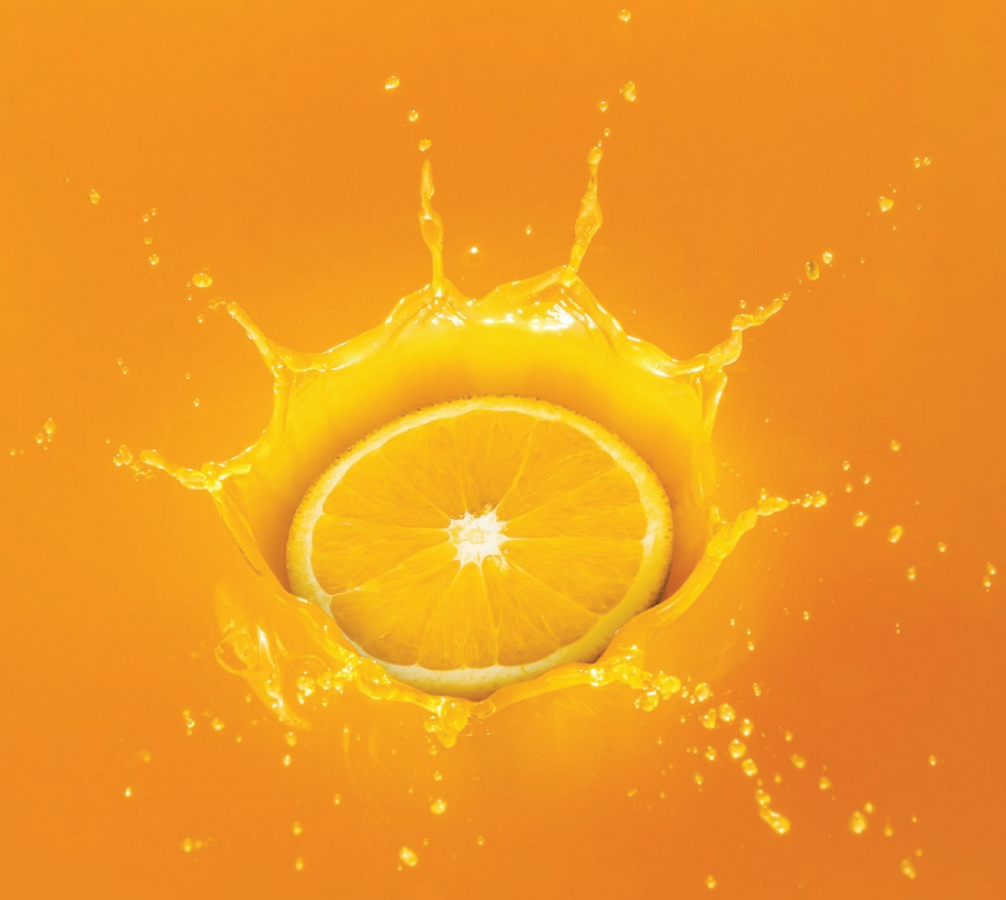

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apomixis into canola would allow breeders to fixate resistance against one disease while also enabling the incorporation of a second disease resistance trait.

Mau explains another apomixis benefit.

"While the majority of the canola research is focused on herbicide resistance and oil and meal quality, very little research has been done on improved hybrid vigour stability," he says. "Seed costs remain one-third of the front-end costs for farmers."

With apomixis, no maintainer breeding lines are necessary, so the cost of seed production is lowered. This should allow small farmers or organizations like the Saskatchewan Pulse Growers and the Canadian Canola Growers to produce their own seed.

If that weren't enough, apomixis will create a larger pool of germplasm, for example, from landraces or wild accessions, which could easily be integrated into breeding schemes of apomictic hybrid elite canola lines. This would allow breeders to restore genetic diversity.

"In my humble opinion, apomixis technology will have its greatest impact on breeders and farmers as it will minimize canola breeding by significantly shortening costs and production time," Mau says. "I don't see overall changes in technical aspects for the seed producers in the Western world but great changes for seed production in the developing world. But all that will depend on how the apomixis technology will be implemented as a business and licensing model in the future."

Protein Game-Changer

Marcus Samuel, along with Sabine Scandola (she performed all the experiments in the study for her PhD under Samuel's supervision, and is now a post-doctoral fellow at the University of Alberta) have identified a key protein in canola that's involved in the pollination process. The discovery and understanding of this protein could make it possible to more quickly and effectively create more vigorous, high-yielding varieties.

Canola farmers plant hybrids created from male plants that pollinate normally and 'male-sterile' female plants that can only receive pollen. Hybrid canola seeds, similar to hybrid corn seeds, can be grown only for a single season because their seeds can't be relied on to produce true copies of the parent plant.

Peter Entz, assistant vice-president in the seed and traits division at Richardson, says the industry is "asking a lot" from canola breeders.

Martin Mau says two main crop science research avenues have been his focus during the last few years, one being so-called "Gene Bank 2.0" projects around the world.

Now, with the identification of this protein, Samuel and Scandola believe the way could be paved to develop new methods for creating canola hybrids.

In addition, canola lines with excess amounts of this protein will have an expedited ability to allow pollen (which has landed on the stigma) to grow down, fertilize the ovule and produce seed.

These plants that more easily accept pollen, says Samuel, should be able to achieve seed production under more challenging environmental conditions.

We're Asking a Lot from Breeders

Peter Entz, assistant vice-president in the seed and traits division at Richardson, notes that at this point in time, "we are asking a lot" from canola breeders.

"We want plants at a certain height, to stand up, have an excellent disease resistance package, be able to be straight cut and, of course, [all of this is] to support high yields," he notes. "And breeders are up for the challenge."

And while Entz points out that farmers must not rely on breeders to solve all the challenges of canola production (farmers must have stewardship practices in place so as not to abuse traits), new crop technology obviously gives famers improved tools for crop production.

"The introduction of new traits in canola, or other crops for that matter, is all about putting more tools in the farmer's toolbox," he says.

"And the value of having more tools is that you are in a better position to manage your crop and your cropping system. New traits such as pod shatter have the ability to change the way farmers farm."

He notes that during the fall of 2018, he observed so many acres of canola still standing where a few years ago, that would not have been the case, which "would have been very stressful" last year for farmers.

An example is TruFlex from Bayer, which allows farmers a wider window of application and to use slightly higher rates of Roundup to achieve better weed control.

"It takes so long to get all the approvals in place, it was a relief to finally be able to bring this technology to market," says Entz.

Since Canada approved TruFlex in 2012, it took until January 2019 for China's Ministry of Agriculture and Rural Affairs to grant a safety certificate approval for the import and food/feed use of it, so it now has the green light for commercial launch worldwide. ■

INSIDERS

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Here, experts from across the industry will discuss issues that are top-of-mind, share technical advancements, talk about tips for success and provide perspective on policy.

What the 2008 Economic Crisis Taught Me

2008 IS A YEAR I'll never forget and not only because it was the year our second child was born. It was, of course, the year of the global financial crisis. It was an emotional event for me, because 2008 just happened to be the year I left the banking industry to start a career in seed processing equipment.

Watching the financial collapse was hard — it was the beginning of a challenging time for some of my friends in the banking world. Things went from being all right to no fun at all for a couple of years. It was a big change for them.

Moving into seed processing equipment was a big change for me. At the time, I was fully immersed in learning our industry and getting to know our customers and figuring out how to do this job.

Our company grew. The market for seed processing equipment like colour sorters only continued to grow. There's a certain amount of insulation between ag and other industry sectors, but what affects one industry affects them all. What led to the 2008 financial crisis was a Wild West mentality that put profit over people. Canada had the benefit of regulations that, thankfully, insulated us from the worst of the banking collapse.

Having 11 years of experience in seed processing equipment, I've learned the best course of action for us as a company is the one that makes things right for the customer — even if it's not the "best" thing for us in the short term. Even if we have to incur a cost now to help the customer, that cost is lower than the damage to our reputation that accumulates over time if you don't make a serious effort to do the right thing. It is not just about being a "good guy" — it drives opportunities for the future.

People who recognize that they depend on others for their success generally don't make "looking out for number one" their philosophy. It's why American banks like Bear Stearns went down and none of Canada's banks did — remembering that you depend on others for your success changes the way you do business.

The business I'm in is one where people who buy things from you will only do so if they trust you. That trust is almost impossible to gain unless they know you're going to look out for them and don't just put yourself first.

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Do You Know What Casuistry Is?

I'M A FAN OF Malcolm Gladwell's podcast *Revisionist History*. It's about historical events and people that have been overlooked or misunderstood. A recent episode focused on casuistry, "the resolving of moral problems by the application of theoretical rules to particular instances," according to the Oxford dictionary.

Casuistry — which dates back to the philosopher Aristotle — helps people make decisions by recognizing that we can't simply use old principles to help solve modern problems. As tempting as it might be to refer to "old wisdom" in helping us figure out modern-day conundrums, we have to recognize that some problems are new and require new ways of thinking in order to solve.

For example, climate change. Never before in the history of the world have crude oil, coal and natural gas been extracted from the ground and burned in massive quantities, and the resulting emissions pumped into the atmosphere at rapidly increasing rates. We cannot think of climate change as a "natural cycle" or simply just another "challenge" that a handful of human geniuses will figure out how to overcome. We need to take steps to deal with it in new and unprecedented ways.

What does any of this have to do with content marketing and promoting your seed business? Well, I don't have to tell you that the business world has changed. Marketing has changed. Technology has changed. You need new guiding principles to get you on the road to success. One of those principles is that you need to promote your business. But how?

Content marketing helps you to promote yourself by showing people who you are and what makes you unique. You can do this through written articles, videos, or podcasts. The sky is the limit.

The key is using a little casuistry to get creative and put yourself in front of them.

So how are you going to do this? See my next column for some insights.

Cheers to Being a Malting Barley Breeder

LET ME GET THIS out of the way right now: Yes, I like to drink beer! And yes, it's also one reason I have dedicated a big part of my life to being a barley breeder.

Breeding barley, especially malting barley, is fun because a lot of the work and conversation revolves around beer and the people involved in the community are very passionate about what they do. It's hard to get bored in an environment like that.

The evolution of the beer culture in North America that we've seen over the past 15 years or so has been very exciting. The diversity of beers that were initially produced mainly by small craft brewers, but which are now being made by brewers of all sizes, has reinvigorated interest in beer and brought in a broader diversity of North American consumers to the community.

As a breeder, it is important to pay attention to these trends as this new wave of brewers and beers are potentially looking for different malting characteristics in barley varieties than the larger adjunct brewers that produce lighter beers. In response to this, we recently released a new malting barley variety, CDC Churchill, which was specifically targeted to all-malt brewers. In addition to having high yields which will benefit the farmer, it has a different malt profile from typical Canadian malting varieties, being more similar to European malting barley, which should suit the all-malt brewer.

But that doesn't mean we've forgotten about adjunct brewers whose beers occupy 85% of the market. CDC Fraser was recently released to meet the needs of these brewers, combining excellent agronomic performance, a strong disease package and a malt profile similar to AC Metcalfe.

Currently, the malt barley industry is dominated by AC Metcalfe and CDC Copeland, but those varieties are almost 20 years old. Maltsters and brewers love them, but with the newer and better performing varieties like CDC Churchill and CDC Fraser coming into the market there are now excellent and better alternatives available that will meet the needs of farmers, maltsters and brewers.

Although releasing a successful malting barley variety takes time and patience, holding a glass of beer and knowing you had a small part to play in its creation is something to raise a glass to!

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Are You Ready for the Full Automation Era?

NASA CHIEF SCIENTIST Jim Green recently said that he doesn't think the world is ready to find life on another planet. NASA's Mars 2020 rover is set to launch next summer and will be the first to collect samples of material from the Red Planet to send back to Earth for testing.

"It will be revolutionary," Green told the *Telegraph*. "It will start a whole new line of thinking. I don't think we're prepared for the results. We're not."

Green's comments made me think of the topic of automation. What most people in the seed industry do is use semi-automated machinery. You can control the machine to start and stop, auto clean-out between varieties, open and close gates, etc., but there needs to be a human controlling those functions.

The next level of automation is a totally self-adjusting machine. These machines will be capable of performing virtually all the tasks that humans now perform.

Seed processing plants still require human beings to be stationed in the plant to perform various tasks along the processing line. Truly automated machines won't require this. Seed plants that are completely automated will have one or two people stationed in a main control room while the machines literally do all the work themselves.

No one will need to go down to the floor to adjust between seed lots. The machines will conduct virtually all the tasks now performed by humans. It will be a different world, and just like with life on Mars, we are not yet 100% ready for it.

Not just one part of a seed plant can be fully automated — every part of the plant has to be and it will take several more years for the industry get there. When we do, our businesses will never be the same — but like with any new technology, we will wonder how we ever did it any other way.

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Analyzing Mother Nature's Quality Curve-Balls

A QUICK VISIT to look at a farmer's field turned out to be very worthwhile. An agronomist I am not, but an analyst I am! I've been around enough to know what some of the plant symptoms will amount to for seed quality in 2020.

The 2019 harvest is over. Once again, our attention turns to the year that was and what surprises Mother Nature has in store for us as far as yield and quality for 2020 go.

Driving around Alberta I noted some fields of particular interest. I walked a pea field and on first observation the field was in various stages of maturity. The plants ranged from very brown to bright green. I was allowed to pull several plants as the grower suspected root rot and "some other problem" with mold in the pods.

These I took back to the lab and our disease diagnostician confirmed Ascochyta blight caused by Ascochyta/Mycosphaerella species.

These disease symptoms are most certainly associated with wet conditions and were heightened to a certain extent by hail damage earlier on. The result: lower yield. Wet conditions affected the root development which made the pea plants lay down, so combining was tricky and risked further damage such as cracking, leading to mechanical damage and abnormal seedlings in the germination.

The same issues affected soybeans in some areas of Manitoba. Mother Nature threw a curve-ball in late September when major rainstorms hit the southern part of the province, leaving fields waterlogged just when growers would normally be out harvesting. Soybeans often came off too wet causing swollen beans, which increases the likelihood of mechanical damage and causes internal fractures in the embryos, which leads to issues with germination.

All of this field information is so useful for a preliminary report and helps germination analysts later understand the results through accessing field history. We certainly cannot visit every field, but these insights allow us to prepare for the upcoming season.

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Don't Gamble on Seed Quality

AT THE AG IN MOTION show in Saskatchewan back in July, I was surprised by the amount of barley growers who told me they were having smut trouble. Smut is a seed-borne disease that is very insidious; the best defence is seed testing and applying a good seed treatment. It was a great reminder that using both good seed and a seed treatment is crucial — and 2019 was a good example of why.

Why did so many growers not use a seed treatment on their barley and other cereal crops this year? We started the season with an early spring, and the snow left quick. Because spring arrived so soon, some growers felt there was no point to using a seed treatment.

Lots of people were anxious to get in the field and seed, but the ground was still cool — seeding into cool soil presents a big challenge for a seedling.

Things began to get very dry and many growers sought to cut costs, and unfortunately, seed treatment was one of the first things to get crossed off their list. It shouldn't have been — there are other ways to manage inputs that don't require you to put seed health at risk from a trinity of threats — seed-borne disease, soil-borne disease and insect pressure.

Then Mother Nature threw a curve ball. The rain didn't come until June and in some cases July.

Growers who didn't use a seed treatment suffered the consequences.

As we get closer to 2020, it's key to remember to get your seed tested to you know what you're dealing with and stick to your seed treatment program.

Don't let an early spring or other anomalies fool you into not protecting your seed — it's your most fundamental input and is the beginning of your entire season's production.

Wading Through the Biologicals Hype

THERE IS A BUZZ in the industry right now regarding biological microorganisms for seed treatment.

The tradition is old, but the hype is new — and in some ways it's still the Wild West in this particular product category.

Living organisms have been used for decades by farmers for crop production — in Eastern Europe in the 20th century it was very common since the cost was lower than buying fertilizers, for example.

Historically, results have been hit-and-miss. This is changing. Today's scientific advances allow us to harness these organisms with great precision.

The list of benefits you can achieve from using these living organisms is long. You get advantages like healthy plant growth and natural plant protection, sustainable microbiological enrichment and revitalization of the soil, deposition of bacteria at the plant roots, supply of nutrients like N & P to the plant, production of growth hormones that stimulate sprout growth in width and length, increase in the resistance of plant-to-plant pathogenic microorganisms, activation of other bacterial species in the direct vicinity of the plants and an increase in organic mass due to microorganisms.

Seed treatment with biological organisms combined with pelletizing presents some great opportunities for NoroGard, which inspired me do some non-scientific research into what's on the market.

I am a firm believer in "if it sounds too good to be true, it probably is," so when looking into these products and trying to find a way to separate high-quality biological products from the less serious, I found some useful pointers to share.

Know Your Bacteria. We are talking about living organisms, and in order to get a proper result, it's important to have the correct strain of bacteria. This varies in crops and also in various countries. A supplier that claims to have a bulletproof product for all your challenges is probably not being honest, and some countries have restrictions on selecting and shipping out living material (South America, for example), so getting support from various international bodies for a test result that shows bacterial growth can be tricky.

Raise Your Standards. Since biologicals are made up of living organisms, storage and handling can be tricky — make sure that the production of bacteria is handled in a professional, sterile laboratory and stored sterile, so you don't have contamination that impacts efficacy.

There are some certification bodies that exist, and you should look for biological products approved by these institutions.

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PENNY MAPLESTONE HAS THE PERFECT JOB, SEES BREXIT AS A DARK NEBULOUS CLOUD

When it comes to the UK leaving the EU, the real issue is the complete uncertainty: Are we leaving? When are we leaving? On what terms are we leaving? Marc Zienkiewicz

BREXIT. GERMINATION recently sat down with Penny Maplestone, chief executive of the British Society of Plant Breeders, to discuss that dreaded B-word, and how plant breeders can prepare for Britain's seemingly inevitable exit from the European Union. Our interview was conducted at the International Seed Federation's 2019 World Seed Congress in Nice, France.

Germination (G): How did you get into plant breeding and what gets you up in the morning?

PENNY MAPLESTONE (PM): I have always been in love with plants, right back from when I was a small child out on walks in the countryside with my parents, wanting to find out the names of all the wonderful wildflowers we saw. That love has stayed with me through my whole life. There was never any question I would study anything but botany once I had found out how critical plants are for everything in life; how they feed us, give us feed for our animals, clothe and shelter us, and even produce the oxygen in the air that we breathe.

I learned about plant breeding and plant breeders, how plant breeders take plants which are already incredible — and make them even better, how they improve yield, pest and disease resistance, and quality, making crops better adapted to our human needs. I did my first degree — and this is going to date me a bit — just at the time that plant molecular biology was born, and the first transgenic plants were made. That was a real 'wow' moment for me, and the possibilities seemed endless.

I spent a little time doing research but turned out not to be very good at it. I didn't think it would benefit either me or science if I stayed with it, so I needed to look for something that was going to keep me close to plants but use my other skills. A job at BSPB was advertised. I thought 'I could do that' and I must have been right as I have now been there more than 20 years.

It really is the perfect job. It's a wonderful mixture of plants and politics and people.

Penny Maplestone

Every day is different. I get out of bed in the morning happy in the knowledge that I am off to work with my fantastic team at BSPB and that we are supporting an industry which is genuinely making a positive difference in the world.

G: What does the BSPB look like today? Can you give us a snapshot of that?

PM: The BSPB looks good today. We are in our 53rd year, we have 72 members, which is more than we have ever had before, and that's at a time when the industry is consolidating, so I am quite proud of that. Our services to members are excellent. An ISF study showed that our combined royalty and farm-saved seed collection system is one of the best in the world and has helped to put the UK close to the top of the list globally as one of the best countries to do plant breeding business.

Of course, we don't want to stand still. All the time we are thinking strategically and looking to the future. The industry is evolving, and we want to make sure that we are offering our members top-quality services that will support them for years to come.

G: I want to talk about a big issue that is on everyone's mind. Do a little psychological exercise with you. Psychologists sometimes do that inkblot test where you look at the inkblot and tell them what it looks like to you. I want to do something similar but with a word: Brexit. As a British plant breeder, how does it make you feel to hear that word and why?

PM: My Brexit inkblot is a black nebulous cloud rolling in from the horizon towards me. Every so often it recedes a little, but inexorably it is coming and at some point, it is going to hit me as a reality. On a personal level, I feel sad about Brexit, I feel sad that the UK has chosen to leave the European Union. I voted to remain and when I'm working in ISF and ESA with my colleagues from other EU countries, it makes me genuinely sad that, although we will still work together, it will never be quite the same.

On a professional level, it makes me frustrated and angry, not so much that we are leaving the EU, as that is what the majority of the UK people voted for, but that our UK politicians have spent the past three years playing party politics and looking for individual and personal gain, rather than getting on and working together in the national interest to achieve an orderly exit that will be good for the country and good for business.

G: Are your members prepared for Brexit and what's your biggest concern and your biggest worry about that?

PM: Our members, I hope, are as prepared as they can be. We have certainly worked flat-out in BSPB on this from the day of the referendum result. We were on the phone to the Ministry of Agriculture very quickly to say 'you do know about plant breeding and how crucial it is to UK food and farming? You do know what an integrated European industry this is? You do know about the industry's reliance on European plant variety rights and the EU Common Catalogue for protection and access to markets?' We have been strong in representing our members' views to government, in bringing information back and getting it out to our members as fast as we possibly can so that they can digest it and decide what actions they need to take.

BSPB members were all very well prepared for the 29th of March and had taken steps to prevent any disruption in supply to customers. But then, of course, we didn't leave. So right now, it is quite difficult to be able to advise members on what to do. The real issue now is the complete uncertainty: Are we leaving? When are we leaving? On what terms are we leaving? If we don't know what the end point looks like, it is very difficult to plan, it's very difficult to advise any member on what they should do.

G: Is there still a chance of staying in the EU? If not, what do British plant breeders have to do to prepare and what should British seed companies do to prepare as well?

PM: There is a very slim chance of 'remain'. It is one of the possible ways out of the mess, but very dangerous politically for the country. It would leave a government and a nation having to deal with 52% of the population – the people who voted to leave – feeling disillusioned, disenfranchised, and angry. And they would want to vote out the government that kept them in the EU at the earliest opportunity. So, I think there are many dangers and it could potentially lead to the complete demise of the two-party political system in the UK. It is a possibility, but for these reasons, a remote one.

To prepare now, plant breeders in the UK market place should firstly consider joining BSPB if they are not already members because we have access to government, to government officials and to ministers, so we can represent their views and we can also bring them the latest news on Brexit and what's happening as it happens. Individual companies don't necessarily have that level of access because the government doesn't have the resource to consult with everybody. So, if you are not yet a member of the association, we would very much welcome you to join.

Once you do have that information, as a company you need to look at your business model, consider the different scenarios, and work out what you need to do to be sure that you will continue to have intellectual property protection, and market access on both sides on the channel.

—Editor's Note: This issue went to print just before the Oct. 31, 2019, Brexit deadline, when the UK was scheduled to leave the European Union. ■

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Where's the Meat?

With plant-based protein products becoming a bigger commodity every day, we touched base with some experts to get the skinny on how plant-based foods look so much like their meat counterparts. Alex Martin

PLANT-BASED PROTEINS. Just mentioning the idea can stir up a room — immediately, people take sides. Pro-meat, neutral or pro plant-based. It's hard not to have an opinion on them, even though many people haven't had the chance to taste these proteins.

However, according to the website Plant Based Foods, there's been a 14.7% growth of plant-based proteins since 2014, and by 2020, the global plant-based protein market is projected to reach $5 billion. While there might be strong opinions about plant-based proteins, there's also an increasing curiosity amongst the global market.

"In the past years, there's been a growing global awareness in the U.S. and [around] the world. People are starting to understand that we live in a finite world and resources matter," says Udi Lazimy, senior sustainability and sourcing manager at JUST, a company based in San Francisco, Calif., that has been researching and working with plant-based foods and cultured meat.

"We wanted to look at how to make the food system better, and we think that plant-based solutions offer a path to solve a lot of the problems within our current food system," he says.

Nick Halla, senior vice president for International of Impossible Foods, the company that created the Impossible Burger, agrees. After growing up on a dairy farm and working at General Mills, Halla sees that our current food system isn't working.

"From the economic challenges in agriculture and the resource pressure, there's plenty of problems popping up in our land resources," Halla says. "The life we grew up with doesn't exist anymore — instead, we need to change the system and how it's run."

Both companies saw different answers to this problem and created two different, unique products.

Impossible Foods saw a huge problem in the fact that animal agriculture occupies almost half the land on Earth and consumes a quarter of our fresh water. Their solution? Let's not use animals again, and instead, create a copycat beef product made of these plant proteins. And thus, the Impossible Burger was formed.

JUST saw that the food system's tools were limited, and there were a lot of underused foods that could provide tremendous benefit to them instead of the core ingredients that big food companies use: soy, corn, processed sugar and animal protein. After a lot of exploring, JUST created JUST Egg, a plant-based, protein-packed "egg" that cooks up and tastes like real eggs.

"Animal protein isn't necessary to create really good food," Lazimy says. "We're looking to use plant protein to replace things like eggs and dairy, because they aren't necessary if plants can function

Udi Lazimy serves as senior sustainability and sourcing manager at JUST.

70%

OF CANADIANS SURVEYED SAY PLANT-BASED MEATS ARE HERE TO STAY.

39%

OF CANADIANS SURVEYED HAVE TRIED PLANT-BASED MEATS.

SOURCE: ANGUS REID INSTITUTE POLL

the same way. We think it'll make everything a lot more sustainable."

In order to produce these products, both companies had to think outside of the box when it came to ingredients.

The Impossible Burger mixes a few different proteins together: soy protein to get the "chew" right, potato protein for the form and texture, and heme, which is found in all meat products, to give it the flavour. To make the Impossible Burgers sizzle like meat, they've included sunflower oil to create the fat.

"You have to look at protein production in different leaves and seeds to see what would help mimic the meat look and taste," Halla says. "We've learned that some of these crops are incredibly difficult to grow — that's why there's a lot of widescale corn, wheat and sorghum production. They're so robust."

"These protein-rich seeds are excellent to use — in JUST Egg, we've found that when we isolate the mung bean protein in a raw state, it behaves just like an egg protein when you scramble it in a pan," Lazimy says. "Unlike soy, mung bean has very little evidence of deforestation and it has low water use."

But the real question we want to know… Are these plant-based proteins considered to be healthier than their meat alter-egos?

"We do believe plant-based products are healthier," Lazimy says. "There's a lot of scientific background that shows people have a difficult time digesting red meats. Our egg protein has zero cholesterol, unlike regular egg products. With a plant-based diet, everything can still be healthy and you still get all the nutrition you need, but of course, a balanced diet is most important."

Impossible Foods hasn't stopped trying to make the Impossible Burger healthier — in January 2019, they released a new recipe for the burger that cut the sodium 30% from the original recipe, as well as reducing the saturated fat by 40%.

"As we keep thinking of ways to improve the Impossible Burger, nutrition is on the top of our mind," Halla says. "We're constantly looking to make it healthier, and that's what we're hoping the Impossible Burger version 2.0 accomplishes."

Both companies truly believe that to feed the world's population by 2050, farmers, seed companies and food companies need to work together to change our food system. For them, plant-based proteins mean the future of agriculture's value chain.

"Change can be scary," Halla says. "But there are huge opportunities in the space of plant-based proteins. If we can add more value back into the value chain, then we can have a much more diverse and sustainable world." ■

The Impossible Burger gets its impossible taste from heme, a molecule full of iron that makes meat taste like meat. Meanwhile, JUST Egg gets its unique texture from mung beans, which scramble like real eggs.

WHAT IS HEME?

There are plenty of things that make its way into the Impossible Burger, but the biggest question on everyone's mind: how does it taste exactly like a beef burger?

The answer: heme.

Heme is the secret ingredient to life on Earth — it's a molecule full of iron, and it's actually the molecule that grabs oxygen from your lungs and carries it through your bloodstream. But more importantly, heme makes meat taste like meat. It's what our body yearns for and craves when you take a bite out of a juicy burger.

"The craving for meat is really a craving for heme and the iron and protein it represents in the diet," says Pat Brown, founder and CEO at Impossible Foods.

However, heme doesn't always appear in plants. So how does Impossible Foods create heme inside their plant-based burger? They make plant-based heme by fermentation of genetically engineered yeast.

They started by looking at a lot of different forms of protein, before they identified soy leghemoglobin, which is a protein that contains heme. It can be found in its natural form, in the root modules of natural plants, or it can be created by fermentation, which is much easier to create and maintain in a lab.

"Yeasts are used for making other proteins in certain kinds of beers and wines, so it's something that people are used to," says Smita Shankar, principal scientist at Impossible Foods. That DNA from the soy leghemoglobin then helps the yeast make its own heme, which gives the Impossible Burger its impossible flavour.

engAGing Youth to Get Agri-Food Curious

Agriculture in the Classroom Canada is set to bring a new and exciting interactive event to three urban areas in Canada over the next year. Marc Zienkiewicz

WHEN SASKATCHEWAN'S Tanvi Pandya was in high school, she participated in a program sponsored by Farm Credit Canada (FCC) to inspire young people to get curious about a career in agri-food and let them know there's more to this sector than they ever imagined.

Today, a few years later, the 20-year-old is finishing up a degree in business and working as a customer service representative for FCC.

"People often think agriculture is all about being a farmer, but there's something for everyone in this industry," she says. "Even though I don't farm, my work helps people who do. I really feel purpose when I come to work, knowing that in my own way I help feed the world."

FCC and Agriculture in the Classroom Canada (AITC-C) — with the help of volunteers from across the industry — are setting out to find more young people like Pandya who represent the future of Canada's agriculture and food industry. They are excited to bring their newest event — engAGe — to three urban centres in 2019-20.

This high energy and motivating event will bring together over

Marty Seymour, director of industry relations for Farm Credit Canada, says in this age of social media, it can be a challenge to get agriculture's message out to young people — which is why an event like engAGe is so important.

Tanvi Pandya, 20, is finishing up a degree in business and working as a customer service representative for FCC.

"WE KNEW WE HAD TO DO SOMETHING DIFFERENT THAT WOULD MOVE THE NEEDLE."
–Marty Seymour

1,500 students and their educators in Toronto, Montreal and Vancouver, immersing them in a day of learning and exploring the diverse pathways into agriculture and food careers, including science, technology, engineering (STEM), business and more.

The events will be held in partnership with AgScape, the voice of Agriculture in the Classroom in Ontario, British Columbia Agriculture in the Classroom Foundation and the Centre de développement pour l'exercice de la citoyenneté in Quebec.

"engAGe is basically all about opening students' minds to the many amazing, diverse, and dynamic opportunities available to them in agriculture. We know not many students connect a career in ag to science, technology, engineering or math — the STEM subjects. engAGe is all about motivating students to get curious about agriculture and what a career in the wide world of agri-food may hold for them," says Johanne Ross, executive director of AITC-C.

Ross notes that a 2017 Teen Career Inquiry Survey completed by Kynetec determined that high school students are most interested in careers related to STEM, but less than 50% of students realized that agri-food offers these opportunities.

engAGe will consist of keynote speakers who will share their experiences related to agriculture as well as hands-on learning activities and a culinary experience.

"It's going to be very fast-paced, energetic and inspiring, with something for everyone to connect to," Ross adds.

Marty Seymour, director of industry relations for FCC, says in this age of social media, it can be a challenge to get agriculture's message out to young people.

"As an industry we have to move out of our echo chamber and engage these young people and show them that agriculture is about more than just driving up and down a field in a tractor," Seymour says. "We knew we had to do something different that would move the needle."

The event begins in Montreal on Nov. 19, will head to Vancouver on Feb. 11, 2020, and will wrap up in Toronto in early 2020.

For more information visit aitc-canada.ca/en-ca/engage ■

CANADA'S SEED TRADE HAS ROOM TO GROW

Claudio Feulner,
CSTA Regulatory Affairs and Trade Manager

AS I'VE NOTED in this space before, my formal training is in plant cell biology. I got into the trade sphere by looking at phytosanitary and technical regulations. That naturally led me to becoming fascinated by trade and how it impacts our industry — and it's a big reason I'm excited about a new project CSTA is undertaking.

In a couple of months, we hope to unveil our first-ever market development report. It will look at trade opportunities abroad, specifically in Japan and Eastern Europe. These are possible markets for export growth in Canadian seed. The fact we have a free trade agreement with Japan (the CPTPP) leaves the door open for Canadian seed producers to reap the benefits of this. Other opportunities exist as well.

CSTA recently responded to the Government of Canada's invitation to provide comments regarding a potential free trade agreement with the Association of South East Asian Nations (ASEAN). ASEAN is a regional bloc comprised of Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. It represents a significant economic presence in Southeast Asia and a considerable market for Canadians. Canada exports almost $6 million in seeds for sowing to ASEAN markets and imports $5.5 million.

The overall commercial world seed market is assessed to be approximately CDN$64 billion a year as of 2016, according to the International Seed Federation. This is a global market where Canada has a lot of room to grow and expand our market share. Canada imports almost $6 million in seeds for sowing from ASEAN markets and exports $4.5 million. In the period between 2012/2013 and 2016/2017, trade with ASEAN has more than doubled in both imports and exports.

Canada's biggest exports by crop type to Vietnam are canola, soy and flax.

"SEED GENERALLY TRADES WITH NO OR VERY LOW TARIFFS, AND MANY COUNTRIES DO NOT BIND OR APPLY ANY TARIFFS ON SEED FOR SOWING."

CSTA's mission statement is to foster seed industry innovation and trade and as such we encourage the Government of Canada to continuously seek new trade deals. CSTA members export over cover 50 different crop kinds to more than 80 different countries annually. Trade deals help alleviate tariffs but, more importantly in the seed industry, they help to alleviate non-tariff trade barriers. In 2017/18 Canada exported $646 million worth of seed for sowing.

Seed generally trades with no or very low tariffs, and many countries do not bind or apply any tariffs on seed for sowing. While this is an advantage for our commodity type, the seed industry experiences issues with non-tariff trade barriers such as phytosanitary measures and low-level presence policies. Recently, the International Plant Protection Convention adopted a standard for the international movement of seed (ISPM 38) to tackle these issues globally.

We hope to unveil our market development report at our semi-annual meeting in December and continue to support Canada's trade diversification strategy. Stay tuned! ■

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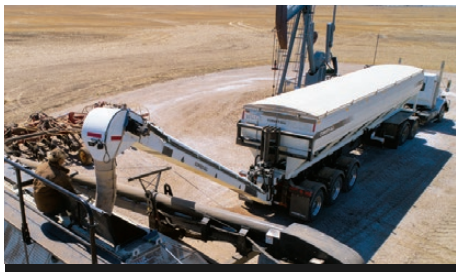

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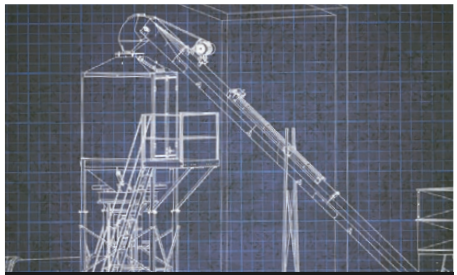

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IS THE FUTURE IN FOOD?

The founder of the first Canadian Summit on Climate Action in Food Systems says it's time we look beyond big yields and commodity agriculture and focus on end users. Marc Zienkiewicz

BRENDA TJADEN is well-known in ag circles. As co-founder of FarmLink Marketing Solutions, she spent years in the world of grain marketing, farm management and communications.

Two years ago, she struck out on her own to discover a new career path — one that led her to form a company called Sustainable Grain, which recently held the first Canadian Summit on Climate Action in Food Systems.

Held Oct. 20-22, 2019, in Kelowna, B.C., its purpose was to create a "safe place" for stakeholders to explore the trends in global agriculture that threaten some models of farming and food distribution, and also to share information on the fast-growing movement of regenerative agriculture and how it addresses the modern challenges of the planet.

"Regenerative agriculture is often perceived as being disruptive to current business models, so it doesn't get talked about a lot among people involved in mainstream ag, especially the seed industry," Tjaden says.

Hence the idea of creating a safe space in which industry stakeholders can talk about it without fear of recrimination, she says.

Tjaden has a long history helping western Canadian farms respond to emerging profit opportunities in growing and marketing their crops. In the process of founding Sustainable Grain, she researched sustainability protocols and the organic value chain, their opportunities and vulnerabilities. She also pursued an education in soil health and regenerative agriculture — both of which go hand-in-hand and have become a passion for her.

Regenerative agriculture is a conservation and rehabilitation approach to food and farming systems focusing heavily on topsoil regeneration. It counts intercropping and cover cropping — both becoming increasingly popular — as two farming methods that fall under its umbrella.

"It really focuses on making farming more sustainable. That's become a loaded word these days, but at its core it really helps us to think about the future and what is going to work over the long term. There are so many things about today's agriculture that simply are not sustainable, herbicide resistant weeds and nine-dollar canola being two big ones," Tjaden says.

Left: Brenda Tjaden is founder of Sustainable Grain.

Above: Ananda Fitzsimmons, founder of Regeneration Canada

Left: Shane Paterson, vice-president of Growers International Organic Foods.

"What do we do different? What do we do besides monocrop canola and rotate herbicides and invest in even more expensive seed technology? That's why I wanted to create this event, which really looks past all the controversy that surrounds topics like this. This isn't about trying to get the industry to change by throwing out pie-in-the-sky ideas and lecturing people about sustainability. It's about the future of farming and seed, and that's food.

"My personal interests take me to food. I'm not interested in big yields or commodity agriculture anymore. There are a lot of emerging opportunities in food and the value chain that conventional agriculture can take advantage of, and that's what this is about — trying to connect

industry stakeholders to all different kinds of farmers and end users so we can begin this conversation," says Tjaden.

Seed as Food

Tjaden sees a future where seed varieties — cereals in particular — have customer-facing traits bred into them like specific flavours and textures, effectively turning seeds into miniature powerhouses that provide end users with exactly what they are looking for.

Enter people like Shane Paterson, vice-president of Growers International Organic Foods, an affiliate of Paterson GlobalFoods. He spoke on the topic of emerging markets for identity-preserved value claims. According to Paterson, modern seed industry paradigms can ultimately undermine the potential of new varieties that are tailored specifically to unique market segments.

"There are a lot of opportunities that stem right from the genetic level. If you have a variety with better nutrient content and better flavour profile that could hit it big in a certain market, are you ultimately doing it a disservice by co-mingling it with other varieties in the class and letting it be just a commodity?"

Paterson says the seed industry and all of agriculture are starting to begin thinking of new ways to do business — and that's where identity-preserved systems like organic farming and regenerative agriculture fit in.

"Farm incomes are at all-time lows and there's no way to differentiate yourself in the marketplace except for the generic quality characteristics of the crop you grow," he adds.

Of course, no crop can grow without a growing medium like soil, and one of the goals of regenerative agriculture is to restore soil health, a message Ananda Fitzsimmons delivered. Prior to forming Regeneration Canada, Fitzsimmons co-founded Inocucor (now known as Concentric Ag) which commercializes agricultural products based on naturally occurring microorganisms.

"The future of agriculture is about understanding the natural process of the soil ecosystem and looking at how to optimize it, but that work has never been done. There are billions of organisms in there that work in synergy and nature's design was to recycle nutrients and deliver them to the plant," she says.

But Paterson cautions that it will take time, and a good dose of practicality, to revolutionize the agriculture industry for the years ahead.

"While we all have ideals that we want to shoot for, reality has to fit into the picture. People don't change farming practices for the good of the world if it means their family isn't going to eat. I see opportunities at events like this for connecting producers and consumers through a value chain that justifies changes in behaviour that might benefit the environment." ■

Cross Pollination

Who said what?

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WOMEN'S CONFERENCE PUTS A FOCUS ON MENTAL HEALTH AND THE BRAIN

Working to break the stigma around mental health and mental illness was Iris Meck's vision in designing this year's Advancing Women in Agriculture (AWC) eastern conference, which took place Oct. 27-29, 2019, at Sheraton on the Falls in Niagara Falls, Ont.

"Mental health is a huge topic right now. There's a lot of information out there in terms of, 'Here's a pamphlet to read, a website to go to, a phone number to call.' That's great, but we have to work to erase the stigma, which still exists. That's what people like Kevin are helping do — coming to the table and talking about it," Meck says.

During his tenure with TD in Toronto as vice-president of commercial and agriculture banking, Kevin Werner opened up to the bank in 2009 about his mental illness — clinical depression.

Coincidentally, the bank was in the process of setting up a national sub-committee to help address and improve the understanding by all employees about people with disabilities, both visible and invisible. Kevin — who had the benefit of having an agriculture background — was requested to be part of this sub-committee given his experience with mental illness.

"By telling people what I've gone through, I want to give them a sense of the warning signs, whether it's something they're experiencing themselves, or if it's a friend or someone in their family," Werner says.

"WE HAVE TO WORK TO ERASE THE STIGMA, WHICH STILL EXISTS."
–Iris Meck

GENE DISCOVERY GOOD NEWS FOR SCOTCH WHISKY LOVERS

Scientists at Heriot-Watt University have identified a gene responsible for drought resistance in barley which, it is believed, could help future-proof the cereals industry to increasingly dry conditions as climate change gathers pace — and help ensure Scotch whisky fans continue to enjoy a wee dram of their favourite tipple for years to come.

Publishing the results of nearly five years of work in the Journal of Plant Physiology and Biochemistry, the team demonstrated that gene HvMYB1 controls stress tolerance in cereals such as barley. This is the first time HvMYB1 has been associated with drought resistance.

Peter Morris from the Institute of Earth and Life Sciences at Heriot-Watt University conceived the research idea.

Morris says: "This is a significant finding that will allow more drought-resistant crops to be bred in the future. Drought is already impacting yields with the European cereals harvest hit particularly hard in 2018. A prolonged, dry and hot summer significantly impacted yields and quality.

"As climate change gathers pace and we experience more extreme seasons, it is essential we can maintain continuity of supply. This is significant for key industries like Scotch whisky, one of the UK's leading export items. Our project focused specifically on barley; one of the three ingredients used in the production of Scotch whisky."

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Farmers in Afghanistan are growing high-yielding crops despite political unrest and investments are being made to help bolster agriculture in Nigeria.

AFGHANISTAN

DESPITE THE SEVERE social and political unrest that constrain agriculture in Afghanistan, many farmers are growing high-yielding, disease resistant varieties developed through international, science-based breeding and made available to farmers as part of partnerships with national wheat experts and seed producers.

These and other findings have emerged from the first-ever large-scale use of DNA fingerprinting to assess Afghan farmers' adoption of improved wheat varieties, which are replacing less productive local varieties and landraces, according to a paper published in the science journal *BMC Genomics*.

The study is part of an activity supported between 2003 and 2018 by the Australian Department of Foreign Affairs and Trade, through which the Agricultural Research Institute of Afghanistan and the International Maize and Wheat Improvement Center (CIMMYT) introduced, tested, and released improved wheat varieties.

"As part of our study, we established an extensive 'reference library' of released varieties, elite breeding lines, and Afghan wheat landraces," says Susanne Dreisigacker, wheat molecular breeder at CIMMYT and lead author of the new paper.

"We then compared wheat collected on farmers' fields with the reference library. Of the 560 wheat samples collected in four provinces during 2015-16, farmers misidentified more than 40%, saying they were of a different variety from that which our DNA analyses later identified." *(Source: CIMMYT)*

NIGERIA

A DOUBLE-DIGIT investment backed by a vibrant rural infrastructural network will help states in Nigeria to accelerate the transformation of agriculture, says Nteranya Sanginga, director general of the International Institute of Tropical Agriculture (IITA).

"No matter our good intentions, we cannot see a transformation in agriculture if we continue to invest less than 10% of our budget on agriculture," says Sanginga.

In 2003, African heads of state in Maputo made a commitment to invest at least 10% of their annual budgets in agriculture.

However, 16 years after the declaration, only a few countries have implemented that declaration.

On rural infrastructure, Sanginga said the government should pay close attention to rehabilitation of rural roads (feeder roads) to help the evacuation of agricultural products from the farm to the markets.

He decried the deterioration of infrastructure in several farm settlements in Oyo state and urged the government to help reverse the trend. *(Source: International Institute of Tropical Agriculture)* ■

The Headlines

Business | People | Policy | Product | Research

Submissions welcome: news@issuesink.com

BUSINESS

NEW MILL TO PRODUCE OAT PRODUCTS FOR THE WORLD MARKET

Paterson GlobalFoods has announced it is building a new oat mill in Manitoba. The facility will be located on the company's 600 acres adjacent to its existing inland grain terminal and ancillary businesses in northwest Winnipeg. The new mill, to be known as O Foods Ltd., will process up to 250,000 metric tonnes of raw oats from western Canadian farmers every year. Construction will begin immediately.

PRIDE SEEDS MARKS 70 YEARS

PRIDE Seeds officially kicked off its 70th anniversary with a cake-cutting at Canada's Outdoor Farm Show in Woodstock, Ont. Doug Alderman, vice-president of sales and marketing, said that while the company has been successful in a competitive marketplace by leading with the latest in seed technology and innovation, PRIDE Seeds has never strayed too far from its roots. The company's corporate offices remain in Pain Court, Ont., where company founder Napoleon 'Nap' King first began growing corn hybrids developed in the American Midwest, back in the 1930s. It wasn't until 1950 that the PRIDE Seeds name was officially established in Canada.

SYNGENTA ANNOUNCES NEW CORN BREEDING FACILITY

Syngenta introduced a new $30 million Trait Conversion Accelerator – a highly-automated "controlled environment" corn breeding facility – at its R&D and seed production facility in Nampa, Idaho. The Nampa facility will house the capabilities and capacity to bring choice in traits to corn growers, the company said.

PEOPLE

CHRIS CHURKO CHOSEN AS NEW CEO OF FP GENETICS

Former Alliance Seed general manager Chris Churko has taken the reins as chief executive officer of the Regina-based FP Genetics. Churko takes over for Rod Merryweather, who has retired.

ROGER ROTARIU TO LEAD NUSEED ENTRY INTO NORTH AMERICAN CANOLA MARKET

Roger Rotariu has joined Nuseed's Calgary-based team as Nuseed North American marketing lead. His priority will be Nuseed's introduction into the Canadian and U.S. canola markets. He will also lead the marketing strategy for Nuseed's North American sunflower, omega-3 canola and sorghum business units. He started in 2014 with Nufarm, Nuseed's parent company, as the Western Canada marketing manager and was most recently Nufarm portfolio and customer marketing manager, responsible for Canadian and North American cereal portfolios. He is also a current director on the board of the Canadian Seed Trade Association.

PRODUCT

SEED WORLD LAUNCHES DIGITAL PLATFORM TO HELP SEED PROFESSIONALS ADVANCE

The team behind *Seed World* pulled back the curtain on a new digital platform, Seed World PRO, to help professionals in the seed industry grow their skill sets, build business and navigate the complexities of the market. "We have surveyed hundreds of seedsmen and women and the one resounding message we kept hearing was, 'We don't need more information, we need the right information,'" says Shawn Brook, *Seed World* publisher and president of Issues Ink. "With Seed World PRO, we are stepping up to the challenge and bringing people together online and providing learning opportunities."

Built on three pillars, Seed World PRO members can access actionable content, address concerns in a private networking group and access a panel of industry experts through the advisory board. There's also a concierge service for quick questions and information requests. Interested individuals can sign up for a 14-day free trial at **www.seedworld.com/pro**

RESEARCH

SCIENTISTS TRACK THE INVASION OF HERBICIDE-RESISTANT WEED INTO CANADA

A team including scientists from the University of Illinois has identified the ways in which glyphosate-resistant waterhemp has emerged in corn and soybean fields in southwestern Ontario. In a study published in *Proceedings of the National Academy of Sciences*, the team says that glyphosate resistance, first detected in Ontario in 2010, has spread thanks to two mechanisms: first, pollen and seeds of resistant plants are physically dispersed by wind, water, and other means; second, resistance has appeared through the spontaneous emergence of resistance mutations that then spread.

The researchers found evidence of both mechanisms by comparing the genomes of herbicide-resistant waterhemp plants from Midwestern U.S. farms with the genomes of plants from southern Ontario. From a practical standpoint, the study adds insights into what farmers need to do to reduce the occurrence of herbicide-resistant weeds in their own fields. Patrick Tranel, professor in the Department of Crop Sciences at the University of Illinois and study co-author says, "Not only should farmers be using crop rotations and multiple effective herbicides with different modes of action to delay resistance, but also they must be vigilant so that new resistant biotypes, and even new weed species, don't move into their fields." *Source: ACES Research.* ■

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PLANT BREEDERS AND GENETICISTS ARE NOT "SEED BARONS". HOW DID DAN BARBER GET IT SO WRONG?

Wayne Gale,
Chair of the American Seed Trade Association and Stokes Seeds president and CEO

"THIS INDUSTRY IS A LOT MORE THAN ROW CROPS, AND IT'S A LOT MORE THAN 100 COMPANIES ..."

BY NOW, I'm sure most of you have seen the *New York Times* opinion piece by celebrity chef Dan Barber titled "Save our Food from the Seed Barons". Barber makes some sweeping generalizations that mischaracterize the changes in plant breeding and the seed industry over the past 100-plus years.

Barber has taken an active role in the seed industry, even co-founding his own seed company — but he grossly misses the mark in his article. The evolution of this great industry is due to the incredible investment — of both the public and private sectors — of time and money in critical research and development. This forward-thinking investment by seed companies, plant breeders, geneticists, agronomists and many others, has dramatically increased the understanding of what, genetically and biologically, makes a plant do what it does — ensuring we are well-prepared to meet whatever challenges come our way in global food and agriculture production.

I agree with Barber that crop production across the U.S. has changed dramatically. It's had to, as farmers, ranchers and other agriculture producers are facing a number of challenges impacting their livelihoods. To stay competitive, they are being forced to do more with less, to produce higher yielding crops on fewer acres, with the use of fewer resources. At the same time, the agriculture community is dealing with rapidly-evolving plant pests and diseases, as well as a changing climate. In addition, a myriad of other issues like labour and harvesting, packaging and shipping, government regulation and so much more — many of which, at some level, can be addressed through plant breeding.

This industry is a lot more than row crops, and it's a lot more than 100 companies, as Barber implies. As someone involved in the leadership of the American Seed Trade Association, and who has worked in the vegetable seed sector for more than 30 years, I know full well the tremendous diversity and reach of this business we call "seed." From seed companies and farmers, to distributors and technology providers, our industry is dynamic and wide-ranging. From organic, to traditional, to biotech, the seed industry offers farmers and consumers unprecedented choices when it comes to performance and variety.

For farmers, this means the ability to produce new and improved varieties of better-performing and more sustainable crops.

For consumers, this means access to a variety of new and improved food options like: carrots with increased beta-carotene, which improves both the appearance and nutritional profile; fruits and vegetables that are more convenient and appealing for consumers, like personal-sized seedless watermelons, mini-peppers and grape tomatoes; better tasting produce that is more likely to become part of a healthy diet, like butternut squash with an unusually rich, sweet, starchy flavour; and new varieties of fruits and vegetables, such as broccolini, kale and improved varieties of cauliflower. I would guess that Barber has served many of these things at his restaurant. And none of them would exist without modern plant breeding!

It is true that the seed industry and the grower community spend tens of millions of dollars on plant breeding and plant science issues on an annual basis. These efforts work to address many of the issues highlighted in the Barber article, such as: how to breed heirloom flavours in conventional market tomatoes; how to create greening disease resistant citrus trees; how to enhance healthy oils in crops like soybeans and sorghum; how to enhance flavours in leafy green lettuce varieties; and a multitude of other innovative research and discovery projects.

Plant breeding will continue to evolve because that's what breeders, geneticists and others do — they discover and create new varieties on a regular basis. Science changes, and I imagine that Gregoire Mendel would be very proud of where the plant breeding and plant science community has evolved to from his very early genetic discoveries with his peas.

The seed industry has and will continue to evolve to meet the changing needs of farmers and the changing demands of consumers and — yes — even chefs. ■

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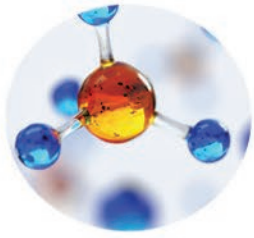

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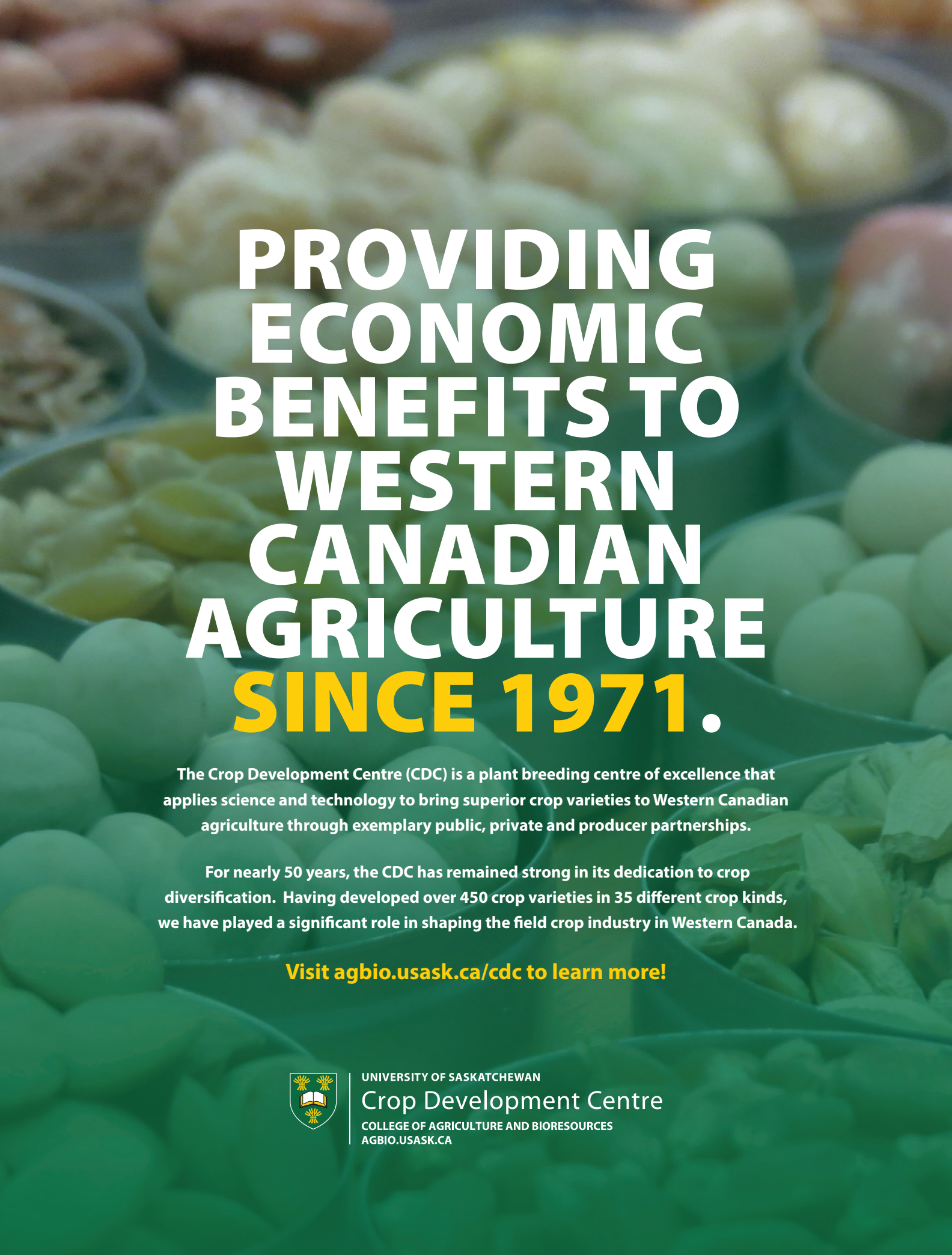

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