The Crop Development Centre will turn 50 years old in 2021. In a six part series written by freelance writer Kathy Fitzpatrick, we look back at the story of how the centre came to be and some of the successes it has seen over the past 5 decades.

More than 500 registered crop varieties in 50 years. That alone is an admirable record for USask’s Crop Development Centre (CDC). But by far, it’s not all the CDC has to show for a half-century of service.

Also count in the expertise passed on: grad students trained; scientific papers and books published; farmers and other agriculture and food industry players educated through extension activities. Among faculty honoured for this knowledge transfer is cereal and flax pathologist Randy Kutcher, recipient of an Award of Merit from the North American Colleges and Teachers of Agriculture in 2020.

For some trainees, their experience evolved into a lasting professional association with the CDC, an organization within the Department of Plant Sciences in the College of Agriculture and Bioresources. “It’s been twenty-five years of me having the great opportunity to work with that organization,” said alumnus Bill Greuel.

To date, nearly 300 students have pursued graduate degrees in connection with the CDC. Many have landed leading roles in government, industry and academia.

In fact, the CDC has produced a multi-generational chain of wheat breeders. Bob Baker, who arrived in the late 1970’s, trained Pierre Hucl (who recently served as interim Managing Director). Hucl in turn mentored Curtis Pozniak, current CDC Director.

Other current faculty who came up through graduate student ranks include Kutcher, Tom Warkentin (field pea and soybean breeder), and Aaron Beattie (feed and malt barley and oat breeder). Bert Vandenberg, a lentil and faba bean breeder now in the Plant Sciences Department, was trained by the legendary pulse breeder Al Slinkard.

And Kirk Blomquist, field superintendent since 1994, landed the job while working on his MSc under the supervision of feed barley and oat breeder Brian Rossnagel. Both men grew up on prairie farms (Rossnagel in Manitoba, Blomquist near Perdue SK), and became life-long friends.

“Even today Brian and I are in frequent contact,” said Blomquist, who still occasionally seeks Rossnagel’s advice.

Another of Baker’s students, Stanford Blade (MSc Crop Science ’87) became Dean of Agricultural, Life and Environment Sciences at the University of Alberta. The University of Manitoba’s Plant Science faculty includes two former students of now-retired winter wheat breeder Brian Fowler, Anita Brulé-Babel and Martin Entz.

Entz’s work focuses on natural systems agriculture. He said he gained the confidence to step into an area which he describes as “not well supported” after seeing the “can-do” attitude within the CDC, in particular Fowler’s risk-taking work on cold hardiness in winter wheat.

“I think the fact that I was working in a field that was emerging and had many, many problems but we kept trying and we didn’t give up, that was a very important lesson. And that has inspired me,” Entz said. To him, Fowler was “a very patient but very wise mentor” whose determination has continued to guide him.

The appeal of working with Fowler – and the quality of the people at the CDC in general – drew Entz to pursue his PhD there. It was a sharp turn in his career path. Having obtained a Master’s degree in horticulture, Entz had been working as an agronomist in the sugar beet industry. He had considered doing his PhD on sugar beet weed control at Colorado State University. However, he then thought that if he was going to...
work in Canada he should know something about wheat. His eyes turned to the University of Saskatchewan.

Enz also believes his time at the CDC made him more versatile because “we weren’t just focusing on the breeding program.” He speaks with admiration for not only Fowler, but also Fowler’s close collaborator Larry Gusta, “a world-class cold acclimation physiologist.” Enz’s PhD work focused on drought stress physiology, in the years he was there (1984-88), Enz considered the CDC unique in Canada by virtue of its size. Being so well resourced “gave it the critical mass that made it really special.”

Not that the facilities were quite so impressive back then. Although he and his colleagues worked out of Atco trailers, Enz said he could find what mattered were the people, their spirit and “the questions we were addressing.”

The CDC attracted numerous graduate students from across Canada with whom Enz created lasting relationships. They are now all over the world, Enz said, creating a valuable network for him that he otherwise would not have had.

Brandon was awarded an MSC at USask under the supervision of former CDC Director Bryan Harvey, himself a world-class cold acclimation physiologist. Enz commented on the need for more future private sector investment in plant breeding, and said he had money to support a graduate student if he could find the right person.

The next day Bill Greuel called Schuler. They put together a project concept and pitched it to the Department of Plant Sciences. It led to what Greuel describes as a very unique arrangement at the time: working for a private sector company but doing his research under the guidance of professors in the department.

“Here comes this kid just finishing off his undergraduate degree, with an industry partner and they were completely open to that arrangement,” Greuel said.

Greuel’s graduate work was in hybrid canola seed production. Although no one at the CDC was working in canola, Harvey had done some of his own undergraduate and graduate work in that area. Hence, he was able to guide Greuel’s research with a depth of knowledge and understanding of both the plant genetics and the industry. Greuel also counts among his mentors Graham Scoular in Plant Sciences, and Baker. Greuel said Baker in particular taught him how to craft research design, and also the importance of correlating lab and field results to understand what is happening in the production environment.

The many other accomplished and influential CDC alumni include several at Agriculture and Agri-Food Canada (AAFCC). Bob Graf, who earned his PhD in Plant Breeding and Agronomy under the supervision of Gordon Rowland, is Principal Research Scientist in winter wheat breeding at AAFCC’s Research and Development Centre in Lethbridge, AB.

At the same facility, Paritha Balasubramanian is a research scientist in dry bean breeding. Earlier, she arrived from India with a BSc in Agriculture and obtained both his MSC and PhD in plant breeding at USask. Meanwhile, at the facility in Brandon, MB Kirby Nilsen heads the oat breeding program.

A strong rapport between Nilsen and his supervisor at the CDC launched him on the path to his current position. Nilsen completed both his Master’s and PhD degrees in Plant Sciences at USask under the supervision of Pozniak before going on to join as an assistant plant breeder at the CDC.

Nilsen had always been interested in plant breeding, he said, having earlier worked in a couple of plant breeding programs in private industry. But his career choice was firmly made when he saw his BSc in Agricultural Biology, he took a fourth year course in plant breeding with Pozniak. The two hit it off, engaging in a long academic and after class. “I recognized the passion that he has for what he does as a plant breeder, and i think some of that probably rubbed off on me,” Nilsen said.

Originally from Saskatoon, Nilsen said USask will always be home to him and the decision to move to AAFCC in Brandon was made easy. “A major factor is that his wife is from Manitoba, and farms there with her family too.”

He initially obtained a position in wheat phenomics. Phenomics uses technologies such as robotics and aerial drone imaging to collect data in the field. The information is used to assist in making selections for plant breeding. When the oat-breeding position opened up, Nilsen went for it. CDC alumni can also be found beyond Canada’s borders. For example, Asheesh (Danny) Singh is now a Professor of Agronomy at Iowa State University. After first earning his Bachelor’s degree in agriculture and animal husbandry in India, Singh went on to complete his Master’s degree at USask under Rossnegel’s supervision, before doing his PhD at the University of Guelph and then spending six years as a wheat breeder at AAFC.

Over in Indiana, Lasantha Ubayasena has recently joined the plant breeding technology company iHarv Agriculture as a Senior Research Scientist. There, he is leading the establishment of Molecular Breeding and Genotyping activities to support the company’s growing precision breeding programs with their proprietary gene editing technologies.

Greuel’s arrival at the CDC illustrates its particular strength in collaborating with the private sector. Just finishing his undergraduate degree in agricultural biology, Greuel seized a sudden and unexpected opportunity he heard about. His brother, who was pursuing his Master’s in agricultural economics, had attended a seminar in the College of Agriculture where gene editing was discussed. Schuler commented on the need for more private sector investment in plant breeding, and said he had money to support a graduate student if he could find the right person.

Previous to Corteva Agriscience in Johnston, Iowa Lasantha Ubayasena led the development and implementation of next generation genotyping technologies to support genomic breeding and trait introgression programs.

Back in early 2008, a more risk-taking and good fortune landed Ubayasena at the CDC. Nothing had been arranged in advance of his arrival in Saskatoon from his home country, Sri Lanka, with family in tow. He had simply heard about the local scene from friends who studied in the Department of Plant Sciences.

He was very interested and knowledgeable in the use of molecular markers in plant breeding, “I came with that mission” he said. He arrived at a time when the technology was gaining momentum at the CDC.

Ubayasena had already earned his undergraduate degree in agriculture. That was followed by eight years as a research officer in genetics and plant breeding at Sri Lanka’s Sugarcane Research Institute, where his work included the initiation of molecular marker development and the conventional breeding program.

It took him only a few days after landing in Saskatoon to find a research assistant position at Socrates and Branka Barli in their Crop Molecular Genetics Laboratory. He then got funding to do his Master’s degree under their supervision. Following work at AAFEC, Ubayasena returned to Socrates’ lab to work on a project funded by Genome Prairie.

Asheesh (Danny) Singh is now a Professor of Agronomy at Iowa State University.

Ubayasena’s work with molecular markers continued at Dow’s head office in Indianapolis. Corteva, where he subsequently worked, is a standalone spinoff of DowDuPont, itself the product of a corporate merger. His studies with Warkentin stood him in good stead at Corteva. Describing himself as a “lab rat” for his long hours spent in that setting, Ubayasena’s time at the CDC gave him the chance to learn about evaluating cultivars in the field. At Corteva he had to work closely with both plant breeders and lab staff. “I have a really good understanding of both sides,” he said.

Ubayasena also prides CDC faculty and staff for the personal support they gave him and his family after coming
to Saskatoon. “We were struggling from every angle” as they established themselves in a new country, he explained.

In reaching out to farmers, the tradition goes back to Silknott, Pozniak noted. Saskatchewan agriculture is a different beast, especially for the chronically underfunded and underfunded projects.

Meanwhile, Pozniak shared knowledge in written form is just as prolific: 97 conference publications and 65 peer-reviewed papers in that same year.

Now, as the CDC enters its sixth decade, the work of developing the crops of the future continues. Among the highlights:

- Pozniak, working with Pierre Cloutier of the AAFC, is leading the $11.2 million 4D Wheat project, named for its application of cutting-edge genomics to harness diversity, advance domestication, enable discovery and expedite delivery of new sources of genetic variation.

- As land leader Genome Canada notes, wheat supplies the most calories and proteins to the world’s people, but current yield gains will not meet the needs of a growing global population. One possible reason that yield increases are starting to plateau, Pozniak explained, is that genetic diversity is being reduced. “There are more hybrid wheat teams than ever before.”

The 4D Wheat team hopes to tap into some of the diversity that has either been lost or gone unused in breeding, stored in a treasure trove of about half a million different accessions of wheat relatives in gene banks around the world. The challenge is, separating the highly valued traits from the undesirable (such as shattering seeds, tall growth or very late maturity). Genomics will be used to efficiently identify desired traits to be bred into new, higher yielding and more disease-resistant wheat varieties.

Meanwhile, pulse breeders Kirstin Bett and Bert Vandenberg are using genomics to accelerate the development of new lentil varieties that will be highly competitive in the global market. Bett and Vandenberg earlier co-led a project to identify valuable varieties in an agro-ecological area – vital intelligence in the effort to boost production worldwide.

Throughout the project, they co-lead the $7.4 million project called EVOLVE (Enhancing the Value of Lentil Variety for Ecosystem Survival). The aim is to tailor-mold lentil varieties with quality traits such as size and colour that meet the demand of specialty processors such as the pasta industry – varieties more likely to command a premium price.

Disease resistance is a recurring theme in the work of CDC pulse breeders, often in collaboration with their plant pathologist colleagues. For instance, Bunyamin Tar’an is working on high-yielding chickpea cultivars with such traits as improved resistance to ascochyta blight. He is conducting disease screening in collaboration with pulse pathologist Sabine Banniza.

Similarly, through resistance screening of germplasm – including wild relatives of cultivated lentil in particular, and wild relatives of other pulse species – the CDC’s role “is key” in supporting producers as they develop new varieties, Pozniak noted. He is making land purchase a top priority, looking to roughly double current capacity, with an eye to locate the new facilities in the fastest growing part of the province's economy.

Meanwhile, the CDC’s success in attracting new funding and expanding its programs has once again led to efforts to meet the Saskatchewan Growth Plan objectives of the $2 billion to $2.5 billion by 2030. “The work done at the CDC will continue to elevate Saskatchewan’s reputation as an internationally recognized leader in research and bioscience,” Marit wrote. Pozniak wants to spread the word of the CDC’s remarkable impact farther and wider. “As we work to provide the world with sustainably grown and processed food, the CDC’s role in supporting producers at the point of production is key,” he said.

The importance of all this work to the province’s economy cannot be overstated. Saskatchewan’s Minister of Agriculture, David Marit, called research and innovation “the foundation of growth in the agriculture industry,” and the CDC’s role “key” in supporting producers as they develop new varieties, Pozniak noted. He is making land purchase a top priority, looking to roughly double current capacity, with an eye to locate the new facilities in the fastest growing part of the province’s economy.

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