POTATO GENE RESOURCES

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Is the glass half full or half empty when we look at the International Treaty on Plant Genetic Resources for Food and Agriculture?

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Introduction

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA, Treaty) entered into force in 2004 with three objectives: conserve global plant genetic resources for food and agriculture (PGRFA), promote their sustainable use, and ensure fair and equitable sharing of the benefits arising out of their use. Today, the ITPGRFA has 154 member countries (Contracting Parties) along with the European Union (ITPGRFA 2026). One of its most notable features is its multilateral system for access and benefit-sharing (MLS), operational since 2007 and covering 64 crops listed in Annex I of the ITPGRFA.

Negotiations to enhance the MLS began in 2013, with an aim to improve the access and fair and equitable sharing of the benefits arising out of the use of PGRFA. A working group was established with representation from all regions, stakeholders, seed industry, farmers organizations and civil society organizations. Over the years, 14 formal meetings were held alongside discussions during five Governing Body (GB) which convenes biennially. Negotiations halted in November 2019 because of lack of consensus, but resumed in 2022, due to the critical nature of the MLS for food security and a shared recognition of the need for improvements. Numerous informal consultations, national and international meetings were held, in addition to the generation of many studies, documents to support negotiators in pursuit of compromise, most of which are available on the ITPGRFA website (ITPGRFA 2025a).

From November 24 to 29, 2025, the 155 Contracting Parties met in Lima, Peru for the 11th Session of the Governing Body (GB-11), with the set objective to finalize MLS negotiations (**Figure 1**). However, after 14 years of effort, the meeting ended without consensus, leaving the MLS unchanged regarding access and benefit-sharing for PGRFA. At this stage, is the metaphorical glass half full or half empty? To answer this, we must take a closer look at the aspects of access and benefit-sharing of the MLS.

Figure 1. *A view into the plenary at GB-11 in Lima, Peru, November 2025 (Photo by CanDel).*

Access to PGRFA under the MLS

The MLS covers the plant material (i.e., seeds and other germplasm) of globally pooled PGRFA held in national and international genebanks that are subject to the Treaty. All Contracting Parties have committed to maintaining their national genebanks and to providing access to MLS material and associated information. Globally, the combined genebanks hold about 5.8 million PGRFA accessions (ITPGRFA 2025b), of which 2.6 million accessions are available through the MLS. This includes 0.8 million accessions in genebanks of the International Agricultural Research Centres (CGIAR). This pool of PGRFA is made accessible for research, breeding and education under the conditions of the legally binding Standard Material Transfer Agreement (SMTA) of the ITPGRFA that was agreed upon in 2007. Since then, 116,763 SMTAs have facilitated more than 7 million accession transfers, mainly of wheat, rice, maize, and barley. Only 13% of these transfers came from Contracting Parties to the ITPGRFA (i.e., national genebanks of countries), while 87% originated from sources referred to as "Article 15 Institutions", which are international genebanks, mainly under CGIAR, that formally contribute their collections and breeding materials to the MLS.

Of all of the member countries, only 71 countries declared having MLS PGRFA available and, of those, only 56 of the countries provided MLS material to recipients. In contrast, a total of 189 countries were recipients of MLS materials. Europe and North America together account for 95% of all MLS germplasm samples provided from member countries (excluding the SMTAs from the CGIAR centres). It is relevant that Canada is one of the major requestors of MLS material (more than 207,000 accessions since 2007). However, of these, 54% (112,235 samples) were supplied by its own national genebank, Plant Gene Resources of Canada (PGRC) in Saskatoon, Saskatchewan (**Figure 2**).

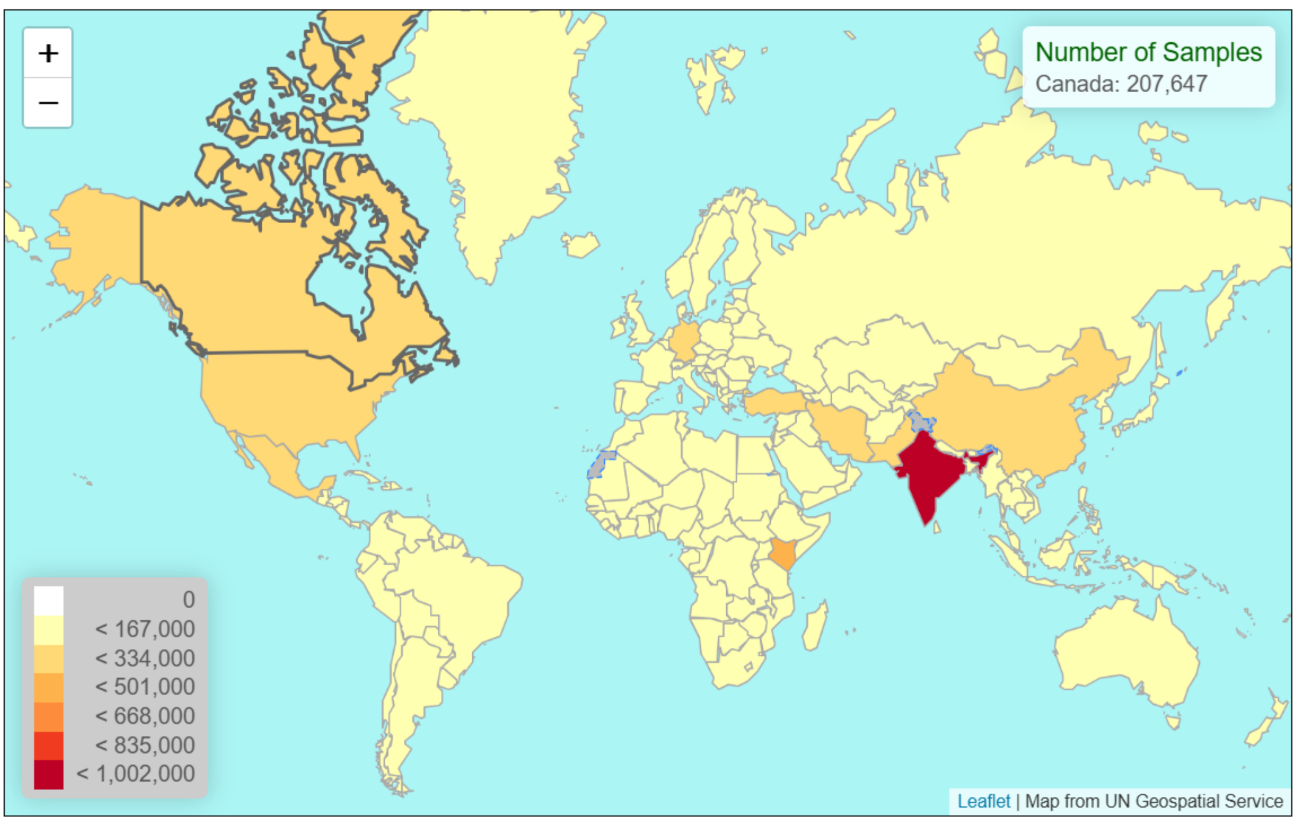

Figure 2. *Heat map showing how many samples of MLS PGRFA were obtained by each country since 2007 with the number shown for Canada (source: ITPGRFA 2025c).*

Access to MLS germplasm from national genebanks is largely driven by developed countries distributing materials domestically or to other nations. Developing countries play a large role in global germplasm exchange mainly due to the work of CGIAR genebanks, which are located in the developing world. It must be noted that many of the PGRFA samples conserved in CGIAR genebanks have their geographic origin in developing countries, including many that have not declared any PGRFA as available from their own national genebanks.

Benefit-sharing as part of the MLS

Benefit-sharing encompasses both non-monetary and monetary and components. Making germplasm as well as associated data available through a genebank and its information system is a clear example of non-monetary benefit-sharing. Similarly, sharing research results via publications or databases, and sharing cultivars without restrictions, as well as training researchers and students from other countries in plant breeding, germplasm conservation or related technologies fall under this category. However, scope and impact of these benefits can be a challenge to quantify.

The MLS negotiations have primarily focused on the monetary component of benefit-sharing. Following finalization of the SMTA in 2007, it was assumed that user-based payments from the commercialization of new plant cultivars that have MLS material in their pedigree would act as a reliable source of income to the ITPGRFA's Benefit-sharing Fund (BSF). However, such payments have been modest. Canadian voluntary user-based contributions amounted to 3,187 USD (ITPGRFA 2025d). The total funds obtained by the BSF were 36.8 million USD. The average annual total income to the BSF from 2009 to 2025 has been 2.3 million USD. Only 2.2% of this income resulted from user payments associated with the SMTAs for accessing MLS plant material and the remainder was provided by country donations, namely from Norway and Italy, followed by the E.U., Spain, Australia, Ireland, Germany, Sweden, Switzerland, Indonesia and Austria.
A report provided to the MLS negotiation working group about global seed sales puts this also into perspective (Shoham 2024). In 2023, the global seeds sales amounted to 53.5 billion USD. Of these, nearly 50% were from sales of genetically modified seeds, including for example the canola seeds sold in Canada. The seed sector is dominated by a few global players, with approximately 70% of global seed sales being made by the top ten companies with each of them having more than 500 million USD of seeds sales per annuum. The average annual actual income of the BSF, including the 89% donations by countries, represented a minimal fraction (0.00034%) of the global seed sales.

Why could negotiations not be resolved in Lima?

Major differences among countries persisted regarding three issues that had been identified as "hot spots" for the negotiations in 2022:

1. Revisions to SMTA access structure and payment obligations to:
    - guarantee more user-based funds flowing to the BSF, including payments for accessing MLS collections by creating a Subscription Option for users of MLS material; and

- make payments under the Single Access Option under all circumstances obligatory if commercialization is involved.

2. Expanding the currently listed 64 crops listed in Annex I of the ITPGRFA to al PGRFA.
3. Integrating access and benefit-sharing for Digital Sequence Information (DSI)/Genetic Sequence Data (GSD) associated with PGRFA into the SMTA or otherwise regulating it under the MLS.

The context for the MLS enhancement negotiations shifted with respect to the DSI/GSD issue following the Convention on Biological Diversity's (CBD) decision from November 2024 to establish a Multilateral Mechanism (MLM) for monetary benefit-sharing related to DSI (CBD 2024). Unlike the MLS, the MLM is not legally binding. The SMTA is also a legally binding contract between the Provider of PGRFA, typically a genebank, and the Recipient for purposes of breeding, research or education. Several countries, including Canada, rejected integrating the undefined term DSI/GSD into the SMTA, and rejected equating physical PGRFA material with DSI/GSD, viewing it solely as information associated with the material. Beyond the above mentioned three "hot-spots", other contentions proposals arose. These included new SMTA provisions that could be in conflict with other intellectual property laws, which were considered by Canada to be beyond the scope of the ITPGRFA. Proposals were also made to install mechanisms for tracing and tracking documentation of DSI/GSD associated with MLS material, as well as making payments for access to MLS material obligatory by limiting access to a Subscription Option only, or requiring payments prior to commercialization of a product that integrates material accessed from the MLS.

Opening statements at GB-11 along with the subsequent negotiation group discussions revealed deep, persistent regional divides. Negotiations remained at a stalemate, as red lines among regions would not allow for finding common ground. To seek compromise, Chair Alwin Kopše paired regions with opposing views for bilateral discussions. A Friends of the Chair group was also formed to work on a draft resolution text, while technical/legal experts concurrently reviewed a draft SMTA.

The Chair proposed a compromise package during the final plenary session that included the revised draft SMTA, a scaled-back approach for Annex I expansion, and the establishment of a group to further address DSI/GSD concerns.

Asia (except S. Korea and Japan), Latin America and the Caribbean, Africa, and the Near East opposed the package with concerns over transparency and late delivery of text. In contrast, North America, Europe, and the South West Pacific supported adoption emphasizing the 12 years of negotiation progress. The Chair suggested that a compromise may always be seen as a glass half full or half empty, but ultimately acknowledged that consensus was unattainable.

Conclusion: The glass is…

The existing SMTA remains unchanged. Increased and stabilized user-based payments to the BSF are unlikely in the near future. The question of how to address the benefit-sharing for DSI/GSD also remains unclear. Not expanding the list of crops covered by the MLS is disappointing for many countries including Canada.

Canada will need to continue exploring possible ways forward for DSI/GSD benefit-sharing as future access to PGRFA from global sources is vital for the Canadian agricultural sector as well as for global food security. Solutions could include closer cooperation between ITPGRFA and the CBD's MLM, developing a system for DSI/GSD under a GB resolution, or formally amending the ITPGRFA. Potential next steps could involve voluntary inclusion of additional species in the Annex I on a reduced scale or on a country by country basis. Other issues of importance for Canada that were sidelined will require renewed attention, such uncertainty regarding plants with industrial uses beyond food and feed (e.g., flax for linoleum, rapeseed oil for technical purposes, camelina for biofuel). Canada must continue to remain engaged in developing possible ways forward, as future access to global PGRFA is vital for agriculture and food security.

Is the glass half full or half empty? Multilateral approaches are becoming increasingly challenging, and funding for biodiversity and agriculture related topics has been declining world-wide, threatening sustainable development and food security. National genebank collections will become even more critical if international cooperation erodes. However, history offers hope that shared needs, such as food security, can unite nations. Even at the height of the Cold War, germplasm exchange continued across geopolitical divides. The glass may not be full, but it is far from empty, and with renewed commitment and creative solutions, global cooperation on plant genetic resources could not only endure but thrive.

Acknowledgements

Many thanks to improvements of the text made by the AAFC colleagues Terra Jamieson, Tiina Bundrock, Colleen Nielson and Marcos Alvarez.

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Chauncey Goodrich, godfather of nearly all modern potato varieties, inducted into Hall of Fame

Hielke ("Henry") De Jong[1]; Jan van Loon[2] and Walter De Jong[3]
[1] AAFC; Fredericton Research and Development Centre (retired).
[2] Director Breeding Station Hettema (retired), Netherlands, now private breeder.
[3] Professor Plant Breeding and Genetics, Cornell University, Ithaca, NY

Rev. Chauncey E. Goodrich (1801-1864) was recently inducted into the Oneida County (NY, USA) Historical Hall of Fame. He was born in Troy, NY and graduated from Princeton Theological Seminary in 1828 and was licensed to preach in the Presbyterian church. He married Margaret Tracy, and for twelve years he worked as a pastor. During this time, he and his wife had four children: Anna, Cornelia, Susan, and Rachel. In 1841 he stepped down as pastor and moved to Utica, NY where he started a market garden in 1843 and served as chaplain for the New York State Lunatic Asylum.

After the late blight epidemic struck the potato crop in the northeastern US in 1843 (Stevens 1933), Goodrich raised 13,000 – 14,000 seedlings in his search for a resistant variety (Goodrich 1863 b). He concluded that seed from tubers grown in the highlands of South America (where the potato was domesticated) might be expected to produce new varieties of greater vigor to take the place of those failing. In 1851 Mr. Goodrich obtained several clones from the American consulate in Panama. He assumed that they had come from Chile (which he spelled "Chili"). From these clones he selected one which he called *Rough Purple Chili*. He considered the other clones to be too late in maturity to be of use.

In an extensive biography Gray (1865) reported that even though Goodrich suffered from poor health, for long years he experimented, holding the pen in one hand, and the hoe in the other, noting down peculiarities in the field the most minute peculiarities of each individual plant, and all the circumstances of cultivation, soil and weather, which could influence its growth. Shortly before his death he published two major treatises in which he provided great details of his work: a. *The origination and test culture of seedling potatoes* and b. *The potato. Its diseases - with incidental remarks on its soils and culture* (Goodrich 1863 a and b).

Rough Purple Chili is now extinct but an open-pollinated derivative of it was the seedling *Garnet Chili* (Fig. 1). An open-pollinated seedling of *Garnet Chili* was selected by Albert Bresee and named *Early Rose*, which in turn is a parent of *Russet Burbank* and ancestor of most other modern varieties (Bethke et al. 2013; Plaisted and Hoopes 1989). The Potato Pedigree Database lists 66 varieties which have *Early Rose* as an immediate parent and released in the following countries: Argentina (1), Great Britain (3), Germany (19), Hungary (3), Japan (1), Poland (2), Romania (1), Russia (1), Soviet Union (15), and USA (20). Several of the cross combinations with *Early Rose* (especially in the Soviet Union) were still being made after World War II.

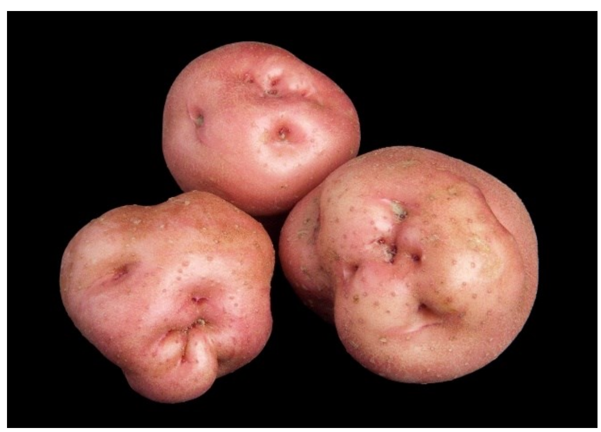

Figure 1. A photo of tubers of 'Garnet Chili' potato variety.

Another variety developed by Mr. Goodrich is *Early Goodrich*. There is a drawing (Fig. 2) and a very favorable description of it on p. 37 and 38 respectively in Best's Potato Book (Best, 1870). Unfortunately, it is now also extinct.

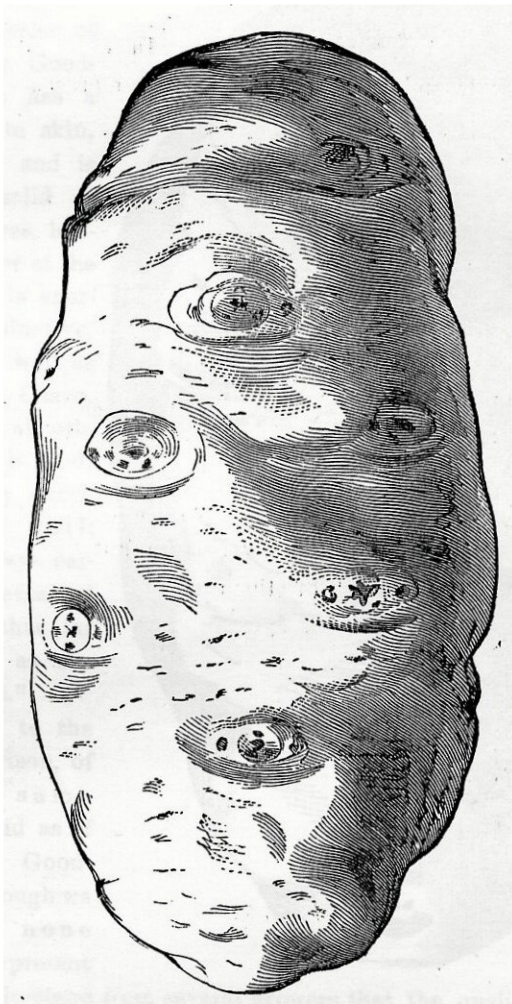

Figure 2. A drawing of a tuber of 'Early Goodrich' potato variety

The funds which Mr. Goodrich received from the sale of potato varieties he developed never amounted to the cost of his experiments. Had his object been simply to make money, with a little business tact his *Garnet Chili* might have produced him a fortune. It was remarked at a meeting of the New York State Agricultural Society, that already at least three million dollars had been saved by the introduction of *Garnet Chili* (Reynolds 2025).

During the *Potato Mania* seed potatoes of new varieties (including *Early Rose*) were sold at exorbitant prices. At one time a single tuber of Bresee's *King of the Earlies* sold for $50! Beecher (1870) wrote: *Goodrich was the pioneer and patriarch of the New Kingdom of Potatoes, but his scholars have carried forward his work to a point of financial success that he himself never attained and have reaped a rich remuneration*. His dire financial straits at the end of his life are illustrated by the simplicity of his gravestone (Fig. 3) in the Forest Hill Cemetery in Utica.

Figure 3. Illustration on Goodrich's gravestone (© P. Reynolds).

In his summary of Goodrich's life Gray (1865) said: *He was a studious scholar, an earnest, practical, Christian man and a benefactor of his race in an eminent sense of the word. In all his labors he was unselfish and devoted to the single thought of permanently benefitting mankind*.

Surely, today's potato breeders stand on the shoulders of giants like Chauncey Goodrich.

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Rambling Rose: In Pursuit of a Family Legend

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For most of my childhood, I was uninterested in my elders. That's a confession I give with some embarrassment, and a painful tinge of regret, but one I think is common amongst my peers. I was too busy minded to listen to the stories and lessons shared with me of times passed. It wasn't until I was older, perhaps 14, that a story sparked my interest. I was in the throes of planning my future, and I had made a decision that I was rather sure of: I would go to school for horticulture, the one thing in my life that had always brought me the most joy and passion. It was a decision that my mom, Lynne Laurin (née LeClerc) was excited about. Standing in the kitchen, over a bubbling pot of soup, she told me a story: one that, at the time, felt like some kind of family legend. She told me about her grandparents, Arthur LeClerc and Dorothy LeClerc (née Cushway). They both were talented and passionate amateur horticulturists- a passion that was carefully tended, through four generations, until it reached me. They homesteaded in the rolling hills of Peace River Country, in the area of Two Rivers, BC, just east of Fort St. John. My great-grandfather, Arthur, had an innovative mind, and was known to have an incredible competency for, as it was once put to me, "screwing around with plant genetics". My mom recounted visits to their homestead when she was young; rows of orchard trees, a huge garden, and a treasured memory of picking two different kinds of apples off a single tree, the crown split in colour down the middle. Her grandfather loved to graft, evident by the many 'experiment' trees found on the property. But this is a story about potatoes, and this is truly what caught my interest that day. My mom told me that, while she didn't know any specifics, in the 1960s, her grandparents bred a new variety of potato. However, much to my disappointment, the potato hadn't been grown in our family since the early 2000s. I carried this family legend with me for almost 10 years until, in 2023, I began my research to discover the identity of this mysterious potato.

My research quickly found me sitting down with my great-aunt, Pauline Lindley (née LeClerc), the daughter of Arthur and Dorothy; a keeper of extensive family history. Over a cup of tea, she shared stories of her life, stories of her parents, and stories of the farm, and as we spoke, through laughter and tears, I felt Grandpa and Granny LeClerc come into colour. She spoke of her proud, traditional father; a hard worker, with endless creativity, and a great affinity for music. She told me of her warmhearted, generous, fiercely courageous mother- a woman who chased a bear from their yard armed with nothing but a broom. A family that loved each other fiercely, and loved others with selfless generosity. She told me of their incredible homestead, and the blessing it was to be raised there. Together, Arthur and Dorothy (Figure 1) tended a garden of around 2 acres- a staggering ¾ of this being the potato patch. They fed their family of 9 year-round with this garden, gifting the excess to family and neighbours, and even selling their potatoes to several independent grocery stores in Fort St. John. On an average year, the potato patch yielded over 20 tons of potatoes. In terms of garden maintenance (and indeed in life), their philosophy was "use your head to save the rest of you." Every few years, they applied a thin layer of well-aged manure, and rotated the crops- they found no further amendments necessary. They were rewarded with rich, dark soil that gave abundantly in return.

Figure 1. Grandpa Arthur & Granny Dorothy Leclerc.

Auntie Pauline shared that the family potato, that I now knew was called Rambling Rose, was medium to large in size, smooth-skinned, prolific, and stored well throughout the winter. For these reasons, it quickly became well-known in the area. It was created by crossing the Norland potato with Kennebec. It was a white potato, with pink eyes, and the aerial parts grew much more like a shrub than a potato; reaching haphazardly in every direction in a 'rambling' fashion. And so the potato was named- rambling, for its sprawling growth habit, and rose, for its little pink eyes (and my great-grandmother's favourite flower). My favourite story from this visit was of a bet between Arthur and his son-in-law, Lester. The two, equal in their stubbornness, were each convinced of the superiority of their respective potato-growing abilities. A bet was struck between the two, that whoever could grow the plant with the most potatoes of ½" or bigger would win. At the end of the season, Arthur's choice, the Rambling Rose, came out astronomically ahead: one plant produced a staggering 76 potatoes, 56 of which were ½" or larger.

I used the information shared with me to track the potato to the Canadian Potato Gene Resources, Fredericton, whom I contacted in spring of 2024. There was still some doubt in my mind as to whether or not this could be the right potato- it seemed to be too good to be true. Regardless, in the hope that my great-grandparent's potatoes had somehow been genetically relevant enough to have made it all the way across the country to the gene bank, I asked to be sent the potatoes so that I could find out.

After one unsuccessful shipment of the potatoes, due to an ill-timed heat wave, I received a second shipment of 6 in-vitro plantlets in July. I planted the potatoes in 1 gallon pots, in a blend of compost, peat moss, mycorrhizal fungi, potting soil, and perlite. After approximately 2 weeks, I shallowly repotted the potatoes in 20 gallon pots, 3 in each pot, using the same blend.

The potatoes quickly took off, and I hilled them as they grew (Figure 2). In mid September, I couldn't wait any longer, and I dug my hand into the soil to finally find out if these were the potatoes. I had spent so many years wondering about. I pulled out a single mini-tuber, and to my excitement, the tuber was white with pink eyes. I am not embarrassed to say I literally jumped for joy.

Figure 2. Mackenzie Laurin, watering potatoes 2024.

A few weeks later, while visiting with family, I was given a news article, published in 1999, that led this story full circle. The article 'Potatoes given federal thumbs-up' (Figure 3) , written by Gerald Gauthier, details the story of how the Rambling Rose (Figure 4) ended up at the Canadian Potato Gene Resources, Fredericton. In 1996, Evelyne Smetaniuk, a friend of my great-grandparents, submitted the potatoes to the Potato Research Centre of Agriculture and Agri-Food Canada, Fredericton (Gauthier, 1999). At the time, she had grown the potatoes for around 30 years, having received tubers from Arthur and Dorothy in the late 1960s. The potatoes were tested for their resistance to eight viruses and to bacterial contamination. Rambling Rose ranked **14 out of 90** varieties tested (Gauthier, 1999) It is due to Mrs. Smetaniuk (Figure 5) that I was able to track down the potatoes, and my family owes her an enormous debt of gratitude.

Potatoes given federal thumbs-up

GERALD GAUTHIER
Staff Writer

Fort St. John

Thanks to Rose Prairie resident Evelyne Smetaniuk, Fort St. John can now boast some of the healthiest potatoes around.

A recent newsletter from the Potato Research Centre of Agriculture and Agri-Food Canada in Fredericton, NB, lists the Rambling Rose potato, developed locally more than 30 years ago, as one of a select group of heritage potatoes tested and found to be virus-free.

Smetaniuk sent samples of the potatoes to the centre in 1996 in response to an advertisement in the Western Producer.

"They were looking for older varieties that were disease free," Smetaniuk said. "In New Brunswick and Prince Edward Island, the potato capital of Canada, they were having to spray (newer varieties) with every known insecticide and pesticide because the others weren't working."

Over the last three years, the Rambling Rose potatoes were tested for their resistance to eight viruses and to bacterial contamination. During that time Smetaniuk heard nothing about how the potatoes were responding to the tests.

"I was flabbergasted. I couldn't believe it," Smetaniuk said of her reaction to finding out her potatoes had made it to the top 14 out of 90 varieties harvested last December.

The Rambling Rose - so named because the tops spread out over the ground - was developed by Arthur and Dorothy Leclerc of Fort St. John in the late 1960s. The potatoes are light brown with pink on one end, and when mature, they range in size from that of an egg to that of a lemon.

"Art Leclerc crossed the Netted Gem with the Norland," Smetaniuk said. "I think he'd be pretty proud of his potatoes.

"In 1966 or 1968 I got some from the Leclercs. I've kept them going for 30 years. They're good eaters. You can do anything with them," she said. "Because they're such a firm potato, they make good hash browns and french fries."

Smetaniuk said she normally harvests the late-maturing potatoes at the end of September. Her secret to growing good potatoes is quite simple: "Peat moss."

"And they like good drainage. I always plant mine on a mound. They don't mind being dry, but they don't like manure."

Gerald Gauthier photo

Evelyne Smetaniuk recently found out that her potatoes are virus-free.

Figure 3 "Potatoes given federal thumbs up" article.

Figure 4. Baby Rambling potatoes, 2024.

Figure 5. Evelyne Smetaniuk.

Around mid October, I harvested the rest of the mini-tubers by hand (Figure 6.). I allowed the tubers to dry in the shade for approximately an hour, then brushed off the dirt. I cured the tubers in a cool dark space for 2 weeks, then moved them to a wooden crate in cold storage. Through the winter, I checked on them often- I was amazed to find that despite their small size, the potatoes remained firm, and did not begin to sprout, until March. In total, my 6 little in-vitro plantlets bore a staggering 52 baby potatoes.
By the time the last of the snow melted away, my family was buzzing with excitement for our first real growing season with the family potatoes. In an attempt at safe-keeping, I planted the potatoes in my own garden, and the gardens of my mom and Auntie Pauline. Throughout the season, each of us felt, in our own way, that the potato was happy to be back in the family. By the end of the season, between the three of us, we received an abundant crop- over 300 potatoes. Perhaps the most fitting end to this story- I am told that next year, if everything goes according to plan, the potatoes will once again be planted on the farm where they first were bred.

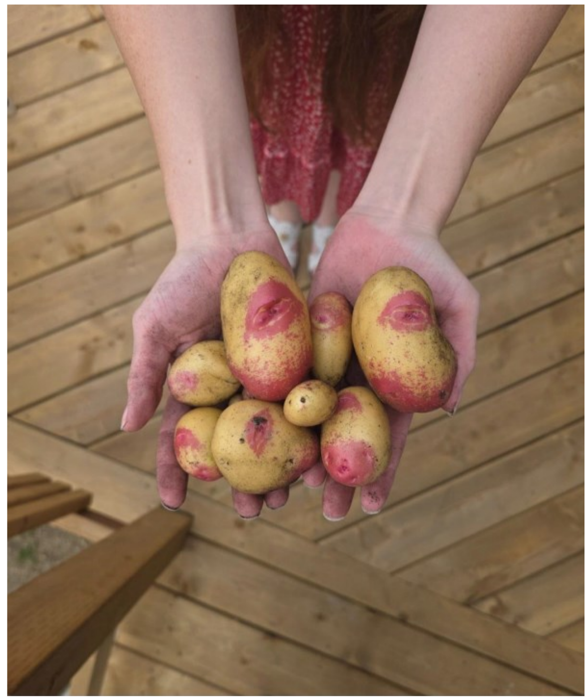

Figure 6. A modest harvest from one plant, 2025.

Neither I, nor my mom, could have guessed where the path she started me on, that day in the kitchen 11 years ago, would lead me. It certainly seemed a far-fetched idea that I would ever be able to track down these potatoes- knowing little more than the whispers of a family legend. But, like a mystery waiting to be solved, the circumstances perfectly aligned. This search tied me to the past: to the stories of my ancestors, and the legacy they gifted to me- in more ways than just growing potatoes. In exploring my heritage- the good, the bad, and the ugly- I met my ancestors, and myself, along the path. It taught me that having conversations with your oldest relatives, and asking them about their lives is perhaps one of the most impactful things you can do. Listen, truly listen, to stories of times passed. In the most unexpected way, you will find yourself there.

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(Author's Note: the only copy of this article is as follows. I have been digging, but I can't find the publisher. My most likely guess is that this was published in the Alaska Highway News.)

Potato Accessions Maintained as True Seeds at the Canadian Potato Gene Resources (CPGR)

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Access to genetic diversity is essential to adapt crop varieties to changing production systems, environment and market needs. A number of potato accessions previously maintained at the Saskatoon Research and Development Centre's Potato Gene Resources facility as true seeds (Fig.1) were recently transferred to the Fredericton Research and Development Centre's Potato Gene Resources Laboratory in New Brunswick, in order to streamline their conservation and sustainable use. The material was initially acquired by Plant Gene Resources Canada in 1983, well before the establishment of the Potato Node of Agriculture and Agri-Food Canada's gene banks network in 1992 (PGR Newsletter, 1994).

Figure 1. A specimen of accessions transferred to the Fredericton Potato Gene Resources Laboratory.

A total number of 16 accessions representing diploid wild species and cultivated landraces were received and are currently maintained as populations in the form of true potato seeds (TPS) (Table 1). This material represents additional genetic diversity and provide genetic tools to breeders and researchers to address current and future challenges faced by the industry. Many useful traits related to resistance to biotic and abiotic stresses as well as end-use quality can be found in this germplasm. Examples of confirmed or expected useful traits are presented in Table 1. Self-compatibility has also been reported in some accessions, which can be of interest to researchers involved in diploid hybrid breeding.

We plan to conduct seed multiplication of these accessions soon in order to produce enough material for distribution to genebank users. Since these accessions are heterozygous populations, users will need to screen them to identify genotypes carrying genes of interest.

Table 1. Germplasm maintained as true potato seeds (TPS) at CPGR.

Species[1]	**Accession Number**[2]	**Confirmed or potential use** [3]
Solanum berthaultii Hawkes (Syn. *S. tarijense* Hawkes)	CN 40330 (PI 265858) CN 40331 (PI 283070) CN 40332 (PI 310926) CN 40333 (PI 310971) CN 40342 (PI 208881) CN 40343 (PI 217457) CN 40344 (PI 275154) CN 40345 (PI 310981)	• Blackleg and soft rot resistance; • Verticillium resistance; • Aphid resistance; • Colorado potato beetle resistance; • Cyst nematode resistance; • Early blight resistance; • Late blight resistance; • Potato virus X resistance; • Potato virus Y resistance; • Spindle Tuber viroid resistance; • Wart resistance; • Cold induced sweetening resistance; • Drought tolerance; • Frost tolerance; • Heat tolerance
Solanum polyadenium Greenm.	CN 40338 (PI 230463) CN 40339 (PI 230480) CN 40340 (PI 275237) CN 40341 (PI 275239)	• Colorado potato beetle resistance; • Late blight resistance
Solanum tuberosum Andigenum group (syn. *S. phureja* Juz. & Bukasov)	CN 40334 (PI 195198) CN 40335 (PI 225668) CN 40336 (PI 225681) CN 40337 (PI 225703)	• Bacterial wilt; • Blackleg and soft rot resistance; • Common scab resistance; • Cyst nematode resistance; • Late blight resistance; • Potato leaf roll virus resistance; • Potato virus X resistance; • Potato virus Y resistance; • Root knot nematode resistance; • Tuber moth resistance; • Wart resistance

1 Based on Spooner's taxonomy (Spooner et al., 2014).
2 Canadian National Plant Germplasm System (CN#) and corresponding PI # (US National Plant Germplasm System)

3 Nagel et al 2022

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ANNUAL REPORT 2025

The Canadian Potato Gene Resources

Sylvia Steeves, Stephanie Browne and Benoit Bizimungu

THE COLLECTION

1. Holdings

Canadian Potato Gene Resources (CPGR) is a specialized node of Plant Gene Resources Canada (PGRC) and currently maintains a diverse collection of over 200 potato clone accessions (**Figure 1**). All accessions are maintained as *in vitro* tissue culture with a substantial number of these also grown in the field for seed multiplication or maintenance at the Benton Ridge Potato Breeding Substation in Benton, New Brunswick. A full listing of accessions is provided with the request form that is accessible by contacting us. The collection is also electronically catalogued and we are in the process of updating the information on the Canadian national plant germplasm system 'GRIN-Global-CA' (Search accessions - GRIN-Global-CA - Agriculture and Agri-Food Canada (AAFC) database-accessible to external users.

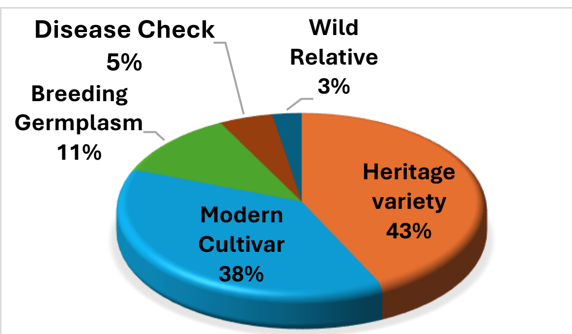

Figure 1. Types of germplasm held in the CPGR Public Collection.

2. New Accessions

Continued acquisition of new germplasm is targeted at filling gaps in the current germplasm collection, including accessions with unique traits necessary to address production problems, Canadian-bred cultivars and elite germplasm, heirloom or varieties that are threatened by extinction.

Following test of genetic distinctness, four new heirloom varieties were introduced into *in vitro culture* and virus-cleaned before incorporation in the national potato gene resources collection:

Rose O'Farrell (CN#124052)

'Rose O'Farrell' potato was donated by René Paquet (Québec) and is thought to have originated from the 'Beauce-Appalache' region in Quebec. Tubers have pink skin and white flesh (R. Paquet, personal communication).

Beauceronne (CN#124053)

'Beauceronne' potato was donated by René Paquet (Québec). This heirloom variety is reported to produce average size tubers with red skin, white flesh and shallow eyes with good culinary quality when baked, fried or cooked "à la grecque"(R. Paquet, personal communication).

Icelandic Red (CN#124054)

'Icelandic Red' was featured in a previous article by Hebda et al 2023 (PGR Newsletter 2022/2023, pp 4-11). It was initially evaluated in British Columbia under the 'Crop-Climate project' aimed to uncover and preserve the agro-biodiversity of Canadian potatoes. 'Icelandic Red' is thought to be a synonym of another heirloom variety conserved in Europe at the NordGen Genebank under the name of 'Raudar Islenskar'.

Corne de Bélier (CN# 124055)

‘Corne de Bélier’ is another heirloom variety donated by René Paquet (Québec) and is reported to produce long, slightly flattened tubers with a horn-shape end. Tubers have light yellow skin and yellow flesh with a multipurpose usage and relatively short dormancy (R. Paquet, personal communication).

3. Regenerations

Fifty-three clones were grown in the greenhouse from *in vitro* plantlets to produce mini-tubers for the purpose of regulatory disease testing, distribution, evaluation and generation of disease-free tuber seed for multiplication, evaluation or maintenance at the Benton Ridge Potato Breeding Substation in Benton, New Brunswick. 1356 mini-tubers were harvested in 2025. Mini-tubers will be distributed to genebank users in the spring of 2026 according to their availability.

4. Evaluations

Twenty-nine accessions including diploid mutant lines were grown in a field evaluation trial at the Fredericton Research and Development Centre in 2025. Two replications of fifteen hills were planted on May 29, 2025 and harvested on October 1, 2025. The accessions included in the trial were: ‘Atlantic’, ‘Black Bull’, ‘Candy Cane’, ‘CH72.03’, ‘Chieftain’, ‘Congo’, ‘CTL1_11_2014_87’, ‘CTL2_2_2014_265’, ‘CTL2_33_2014_273’, ‘EMS1_98_2014_854’, ‘EMS1-138-2014-66’, ‘EMS6_198_2014_976’,‘EMS7_103_2014_73’, ‘EMS7-183-2014-795’, ‘FA-12-4’, ‘FA-12-7’, ‘FA-1-4’, ‘FA-4-2’, ‘FA-9-7’, ‘FS-7-10’, ‘JT-10-1’, ‘JT-10-2’, ‘JT-10-3’, ‘M11-1’, 'M11-5’, ‘Machado Farm Isla’, ‘PR10-65-8LB’, ‘Shepody’, ‘Superior’, ‘Unica’, ‘USDA 41956’, ‘Likely’.

The field evaluation plots are useful for morphological and agronomic evaluations, specific gravity measurements and photographing phenotypic characteristics.

In addition to the evaluation trial, 23 accessions were grown for demonstration in a single replication of ten hills at the Fredericton Research and Development Centre. The accessions grown were ‘Banana’, ‘Beauty of Hebron’, ‘Candy Cane’, ‘Christmas Island Rose’, ‘Congo’, ‘Crotte D'ours’, ‘Elmer's Blue’, ‘Exploits’,‘F87084’, ‘Haida’, ‘Keswick’, ‘Lenape’, ‘Lumper’, ‘Makah/Ozette’, ‘Marc Warshaw's Quebec’, ‘Shepody’, ‘Yukon Gold’, ‘White Rose’, ‘Belle de Fontenay’, ‘Katahdin’, ‘Lumper’, ‘Heidzel Blue’, ‘Russet Burbank’.

5. Collection Management

We are working on updating passport data and other information in the new Canadian GRIN-Global-CA database which can be accessed from the PGRC website.

Disease testing of accessions were conducted for the purpose of : i) regulatory testing by a CFIA-accredited lab for new introductions and regeneration material and ii) in-house testing of the repository

i) Regulatory disease testing was completed in November through a service contract by Agricultural Certification Services located in Fredericton, NB. All new genebank introductions as well as existing *in vitro* accessions (on a 10-year rotational schedule) within the public collection are tested for PVA, PVM, PLRV, PotLV, PVS, PVX, PVY, PSTVd and tuber-borne bacterial ring rot (BRR). All regulatory testing is performed on our greenhouse grow-out material. All clones tested negative for associated diseases.

ii) In-house disease testing was conducted as usual as part of an annual verification of potential bacterial or fungal contamination in the lab.

Safety Backup: A total of 1520 micro-tubers were harvested from 221 of the genebank accessions with additional harvests in progress.

On an annual basis, a portion of the micro-tubers are sent to Agriculture and Agri-Food Canada Plant Gene Resources of Canada (PGRC), located in Saskatoon, SK as duplicate safety backups at a remote site. Regular monitoring and viability data is collected from micro-tubers stored in both Fredericton and Saskatoon remote site.

6. Distribution

Accessions within the Canadian Potato Genetic Resources fall under The International Treaty on Plant Genetic Resources for Food and Agriculture, which requires recipients to sign a Standard Material Transfer Agreement (SMTA), before any material is transferred. Material shall only be utilized, or conserved for training, education, research, and breeding purposes for food and agriculture. All request forms include the SMTA. For more information and assistance in determining whether your plans fall into this agreement visit The International Treaty on Plant Genetic Resources website. By accepting shipment of the requested material, recipients accept all terms and conditions of the SMTA. Recipients names will be submitted to the Governing Body of the Treaty.

In 2025, 20 individual requests were filled with a total of 336 units distributed as in-vitro plantlets or tubers from 80 accessions (**Table 1**). The majority of the requests were for both research and evaluation purposes. The most popular accession requested in 2025 was Pink Pearl (CN# 105514). Some other highly requested accessions were Ozette/Makah (CN# 115227), Alta Russet (CN#124021), Arran Victory (CN# 115231), Green Mountain (CN#105478), McIntyre Blue (CN# 105493) and Shepody (CN# 105528).

Potato clones were shipped across Canada with the majority of requests shipped to New Brunswick and Ontario (**Table 2**). Total number of distributions has been steadily increasing year-after-year since the beginning of the COVID-19 pandemic in 2020 (**Table 3**).

Table 1
Distribution of Clones by Purpose in 2025

Purpose of Request	Number of Requests	Number of Units	Clonal Types		
			In vitro plantlets	Field Tubers	Mini-Tubers
Evaluation	9	111	6	69	36
Research	9	195	52	130	13
Conservation	1	3	0	0	3
Education / Demonstration	1	27	0	15	12
Total	**20**	**336**	**58**	**214**	**64**

Table 2
Requests by Destination in 2025

Destination	Number of Requests
Atlantic Region	8
Central Canada	9
Prairie Provinces	2
West Coast	1
Total	**20**

Table 3
Five-Year Compilation of Clone Distribution Data from 2021 to 2025

Year	Purpose of Request				Units Distributed			Unique Accessions Requested
	Research/ Evaluation	Education	Conservation	Total	Tubers	*In vitro* plantlets	Total	
2021	21	1	0	22	176	276	452	21
2022	11	1	0	12	465	59	524	54
2023	16	2	3	21	900	260	1160	115
2024	20	5	0	25	599	49	599	143
2025	18	1	1	20	278	58	336	80
Total	86	10	4	100	2418	702	3071	-

REPOSITORY ITEMS OF INTEREST

Communication

In addition to the requests for clones, many inquiries are made for information about the genebank. This includes requests for clone descriptions and pedigrees, techniques for handling *in vitro* material, and interest in collaborative projects.

The annual Canadian Potato Gene Resources newsletter has a distribution list of approximately 400 recipients.

Meetings and Miscellaneous Information

September 8-11, 2025 – Dr. Benoit Bizimungu participated in the tenth meeting of the Ad Hoc Technical Committee on Conservation and Sustainable Use of the International Treaty on Plant Genetic Resources for Food and Agriculture in Doha, Qatar.

August 13-15- Dr. Bizimungu (CGPR Curator) participated in the USDA 2024 PGOC Meeting and Curator Workshop that was held from August 13-15, 2024 in Davis, California. Dr Bizimungu gave a presentation on the Potato Genetic Resources program as part of the 'Canadian National Plant Germplasm System Update'.

Visitors and Exhibitions

May 22, 2025 – Dr. Gilles Saindon, Assistant Deputy Minister of Agriculture and Agri-Food Canada visited the Fredericton Research and Development Centre during his Atlantic tour as a farewell as a result of his upcoming retirement.

Fatan Islam, summer student with Potato Gene Resources (left), Sylvia Steeves, Potato Gene Resources technician (second left), Dr. Gilles Saindon, Assistant Deputy Minister Agriculture and Agri-Food Canada (second right) and Dr. Benoit Bizimungu, Research Scientist and Genebank Curator (right).

June 5, 2025 – Canada-Wide Science Fair (CWFS) at the University of New Brunswick, Fredericton, NB. Agriculture and Agri-Food Canada including Potato Gene Resources set up display booths for the science fair participants.

Dr. Benoit Bizimungu, Research Scientist and Genebank Curator (left) and Camille Colombe, communications officer at Agriculture and Agri-Food Canada (right) with a display booth presenting Potato Gene Resources materials at the Canada-Wide Science Fair (CWSF) at the University of New Brunswick in Fredericton, NB.

June 11, 2025—The Science Writers and Communicators of Canada (SWCC) toured the Potato Genebank at the Fredericton Research and Development Centre as part of their annual conference to promote local science and provide professional development to their members.

Dr. Benoit Bizimungu, Research Scientist and Genebank Curator (right) with members of the Canadian Science Writers and Communicators.

June 18, 2025—Director General (DG) of Agriculture and Agri-Food Canada Outreach at the Fredericton Research and Development Centre.. The following DGs were in attendance: Benoit Girard, DG, Coastal Region, STB, Marco Valicenti, DG, Innovation Programs Directorate, PB. Steve Jurgutis, DG, Policy, Planning and Integration Directorate, SPB, Katherine MacDonald, DG, Partnerships and Planning Directorate, STB, Heather Berry, Deputy Director, Indigenous Science Liaison Office, STB, Jennifer Gallant, Director RDT, STB , Josée Owen, Associate Director, RDT, STB.

Heather Berry, Deputy Director, Indigenous Science Liaison Office, STB (left) and Dr. Benoit Bizimungu, Research Scientist and Genebank Curator (right) looking at Potato Genebank germplasm in the Potato Gene Resources lab.

Fredericton Research and Development Centre Website

The Fredericton Research and Development Centre is custodian of the Canadian Potato Genetic Resources. The Fredericton Research and Development Centre website offers an overview of the Centre's mandate, resources and achievements along with research studies being conducted at the Centre and the staff associated with those studies.

Plant Gene Resources of Canada

Plant Gene Resources of Canada (PGRC), the national Canadian genebank, preserves, characterizes and distributes plant genetic resources for food and agriculture. PGRC is based on a collaboration between AAFC Research Centres and people dedicated to preserving the genetic diversity of crop plants and their wild relatives. PGRC plays a significant part of AAFC's commitment to the Canadian Biodiversity Strategy in response to the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources.

The Plant Gene Resources of Canada (PGRC) website includes information on the PGRC multi-nodal system of germplasm conservation in Canada and allows searching for germplasm information on the Genetic Resources Information Network-Canadian version (GRIN-CA).

The Genebank and the Seed Potato System

The Canadian Potato Genetic Resources provides *in vitro* plantlets and greenhouse or field tubers for breeding, research and heritage preservation. While extensively tested for freedom from disease, the plantlets and tubers distributed are produced outside the Canadian Seed Certification System and are not eligible for certification.

The Canadian Seed Potato Certification System operates under the *Seeds Act* and its regulations. Certification begins with tested plantlets established *in vitro* in a facility accredited by the Canadian Food Inspection Agency (CFIA). The plantlets are used to produce greenhouse tubers which then go to the field in a limited generation system, at each step meeting strict standards specified in the regulations. More information on potato seed certification can be found at the CFIA website.

Help us Reduce our Paper Usage

The Potato Gene Resources Newsletter is available as an electronic version. If you are still receiving a paper version and wish to receive future Newsletters by e-mail in Portable Document Format (PDF), please send your e-mail address to Sylvia.Steeves@agr.gc.ca. We will continue to send the printed newsletter to those who do not ask to receive it electronically. Maintaining contact with you is important to us!

Donor Agreement

Donors wishing to provide plant material to Agriculture and Agri-Food Canada (AAFC) for the purpose of research, conservation and distribution by Plant Gene Resources of Canada must complete a donor agreement form. Decisions on accepting material into the Canadian Potato Gene Resources collection are up to the discretion of the curator, Dr. Benoit Bizimungu (Benoit.Bizimungu@agr.gc.ca.ca).

Curator's Note

We continue to make steady progress on updating descriptors and characterization information in the Canadian national plant germplasm system 'GRIN-Global-CA' (https://pgrc-rpc.agr.gc.ca/gringlobal/search) database- accessible to external users. Most potato accessions now have images attached.

Readers will also be interested to know that we are considering establishing a cryopreservation method in order to have more resilient security backups of potato clonal accessions in the national repository. The COVID-19 pandemic has reminded us of the vulnerability of clonal accessions maintained in *in vitro* collections, in case of limited access to the laboratory to conduct regular monitoring and regeneration activities. This highlights the importance of a more resilient system to minimize the risk of losing germplasm. Cryopreservation is a good option because it eliminates the need for regeneration and has minimal maintenance requirements once accessions are in a cryobank. To that effect, a potato gene bank technician has been practicing cryo-techniques (Figure 2.) so that we put the initiative into practice without delay. Safeguarding cultivated potatoes and genetic material in a cryobank ensures their long-term availability for use to help industry manage current and future production issues and contributes to the preservation of genetic diversity.

Figure 2. Stephanie Browne, Potato Gene Resources technician practicing cryo-preservation techniques during training.

I would like to remind our readers to send us research news or updates for publication in PGR Newsletter to share with the gene bank community. I look forward to your continued support and collaboration to advance genetic resources conservation and their sustainable use.

TO RECEIVE THE NEWSLETTER, PLEASE CONTACT:

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