Research in Manitoba Provides Growth for the Potato Industry

Research Manitoba

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How did Manitoba become one of Canada's leaders in potato production?

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Across Canada's heartland, research continues to ensure our agricultural practices are producing at their best capacity today, in ways that sustain and enhance our future productivity.

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Through research

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By increasing yields

—

By improving potato quality

—

Due to Manitoba's unique environment

Growing the Manitoba Potato Industry

Mashed, baked, or fried, potatoes have built some of Canada's largest companies

The highly valuable potato requires very specific growing conditions.

Some regions in Manitoba have the ideal combination of soil type, temperature, and access to an irrigation water source necessary for large scale potato production.

Potato producers are concentrated in areas of silty to sandy soils, primarily in the Portage la Prairie to Carberry region, but also in the vicinity of Carman and in the Morden-Winkler-Plum Coulee district, ideal potato-growing land.

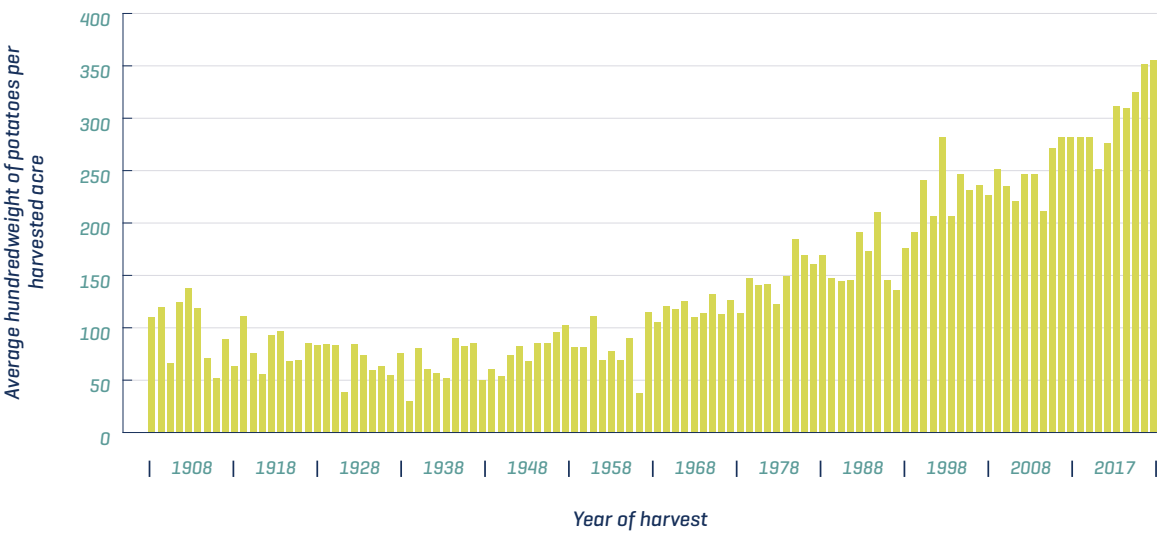
But potatoes are one of the most expensive crops to produce in Manitoba. In 2018, the overall input costs to produce one acre of potatoes was $3,816, excluding the cost of labour.

In order to take advantage of our opportunity and grow the industry sector, maximizing output was critical.

From the early 1900s to the mid-1960s, producers in Manitoba could expect a yield average of less than 100 hundredweight per acre — this grew dramatically because of research.

Hundredweight = 100 pounds of potatoes

Manitoba average yield, potatoes hundredweight per harvested acre



Growing an Industry

Research Investment Nurtures an Industry

RESEARCH FUNDING — APPLIED TO GROWTH	
Agro-Man Program (1980–1984) *Approximately $72,000*	· *Aerial application of fungicide* · *Discovered ideal seed size and improved mechanical cutting technology*
Agri-Food Projects (1985–1990) *$197,319*	· *Wireworm control* · *Reducing sugar end disease*
Canada-Manitoba Crop Diversification Centre (CMCDC) established in 1993 *$3.75 Million* *Governments of Manitoba and Canada, Keystone Potato Producers, Simplot (II) Canada, and McCain Foods Limited*	· *Manitoba potato rotation study* · *Water quality monitoring for fertilizers and pesticides in the Assiniboine delta aquifer* · *Ideal water use and effects of water stress in growing Russet Burbank Potatoes*
Agri-Food Research and Development Initiative (ARDI) I Funding (2004–2008) *$461,380*	· *Nitrogen management and reducing nitrogen emission* · *Continued increasing management knowledge of verticillium wilt* · *Provided data on potato starch as an antimicrobial agent in nursery pigs*
ARDI II Funding (2009–2016) *$691,070*	· *Provided data through animal trials and human trials about the benefit of potato resistant starch* · *Ideal potassium management* · *Provided knowledge about potato late blight pathogens* · *Investigated reservoir tillage and water runoff*
Growing Forward 2 Funding (2013–2018) *$743,287*	· *Initiatives to build the Manitoba Potato Industry* · *CMCDC applied research trials* · *Investigating the influence of nitrogen* · *Evaluating management strategies to control the Colorado Potato Beetle* · *Aerial spore counts of Black Dot and Silver Scurf in potato storage*

Total Approximate Funding: ***$5.91 Million***

Impacts in Manitoba

INNOVATION

Increased potato quality

- *Ideal potato rotation schedule*
- *Monitoring for environmental protection*
- *Ideal irrigation use*

Historically Manitoba has been the second largest potato producer in Canada

The two largest processors in Manitoba are McCain Foods Limited and J.R. Simplot Company

Total Economic Contribution:

1.4 Billion dollars
and
3,000 employees

Creating Jobs and Exports for Manitoba

Manitoba is home to three main processors: McCain Foods Limited, Simplot Canada (II) Ltd., and Old Dutch Foods Ltd. They have been able to remain in Manitoba due to high improvements in potato productivity and quality that sustains their profit.

Using Manitoba's Potatoes

Contributions of the Processors

Over three-quaters of Manitoba's potatoes are used for processing by: McCain Foods Limited, Simplot Canada (II) Ltd., and Old Dutch Foods Ltd. Exempting potatoes used for potato chips by Old Dutch Foods Ltd., all other processing potatoes are used primarily for frozen potatoes products such as: french fries, hash browns, and potato wedges.

Processor	Annual pounds of potatoes processed in 2018	Number of employees in 2018
McCain Foods Limited	329,471,000	333
Simplot Canada (II) Ltd.	299,999,000	275
Old Dutch Foods Ltd.	11,500,000	163

Sustaining the Environment

Nitrogen and phosphorous applications cause emissions. Nitrogen application to the soil releases the greenhouse gas, nitrogen dioxide, into the atmosphere. Scientists at the CMCDC, with funding from ARDI I, conducted field studies, which demonstrated that nitrogen dioxide emissions can be reduced if:

1] nitrogen fertilizer application does not exceed optimal, marketing yield
2] irrigation directly after nitrogen application is limited, and
3] irrigation is managed to prevent soil furrows.

This research added Canadian knowledge regarding greenhouse emissions and demonstrated that a slight change in potato production practices can reduce emissions. As a result of this research two unique peer reviewed papers were published.

Improving Health

MSPrebiotic®

A new company and a first of its kind industry in Canada was built on a foundation of knowledge supported by ARDI II funded studies. The industry: resistant starch from potatoes; the company: MSPrebiotic Inc. The first project that received funding was, 'use of resistant starch and probiotics to control inflammatory bowel disease in humans: infectious diseases model in pigs'. The second project that received funding was, 'assessment of MSPrebiotic® resistant starch as health-promoting in the animal and human nutraceutical industries'.

This second project provided some data that contributed to developing a randomized controlled trial with humans, conducted by Dr. Michelle Alfa at St. Boniface Research Centre. The trial examined the gut microbiome of elderly persons living in a long-term care facility and middle-aged persons living in the community. Resistant starch from potatoes is a prebiotic, and this complex carbohydrate stimulates the growth of good bacteria in the intestines, which is crucial for optimal health. The randomized controlled trial demonstrated MSPrebiotic® meets the criteria of a prebiotic and increases the healthy *Bifidobacteria* in the gut microbiome. The trial was funded by MSPrebiotic Inc., Carberry, MB and the National Research Council of Canada. The results were published in a peer-reviewed paper.

Derek McLaren, Vice-President of MSPrebiotic Inc., shared the following about the value of the MSPrebiotic®, which was discovered upon further examination of the trial's outcomes:

"Another part of the research was in the blood lipid side. We were really interested in looking at impacts on, for example, diabetes. Our research showed that we could lower insulin resistance, which is a huge impact for people that have diabetes, through lowering blood sugar levels."

The results displayed that for older adults living in a long-term care facility the consumption of MSPrebiotic® lowered blood glucose and insulin levels. MSPrebiotics Inc., utilizes potato starch from Manitoba's processors to produce resistant starch, and these results demonstrate that it has the potential to enhance the health of one of Canada's most vulnerable populations.

Research in the Manitoba potato industry facilitates growth in the economy, creates innovative industry opportunities, and has the potential to improve the health of Canadians.

From Seed to Table

Distribution of Manitoba's Potatoes

In 2018, the 77 potato farms in Manitoba (8% of the total potato farms in Canada) accounted for 20% of the total potato production. Through research and innovation, Manitoba now has some of the most productive potato farms in Canada.

DID YOU KNOW?

The Russet Burbank potato creates flawless French fries.

This is the potato variety that is grown in the largest volume in Manitoba.

Manitoba potato producing area

- Potato seed is planted during the third week of April to mid-May
- Developing plants emerge in early June

- It takes 120 days for the plant to reach maturity
- Harvest starts second week of September ending first week of October

- Processors look for perfect sized and blemish free potatoes
- Potatoes are sent to processor or stored until August of the following year

- The majority of Manitoba's potatoes are used to make French fries for fast-food chains throughout North America

Transferring Knowledge in Potato Research

Knowledge Translation

Dissemination of research is a vital part of agriculture. Since the 1950s when the Vegetable Committee of the Manitoba Horticulture Association was formed, producers and scientists have come together to create educational days in January. In the 1970s, Keystone Potato Producers Association began organizing a multi-day, in-depth research conference combined with a tradeshow. Manitoba Potato Production Days is attended primarily by potato producers, agronomists, and technology specialists.

549 **Attended Manitoba Potato Production Days in 2019**

The list of speakers always includes university researchers, industry experts, agronomists, and farm managers. The tradeshow features exhibitors for fertilizers, aerial application, financial services, irrigation technology, heavy-duty equipment, drainage, building, farm machinery, and soil testing.

Local Research Is Essential

In Manitoba, producers make investment decisions for their potato crop based on research.

Potato research is an innovative domain and one that focuses on tailoring practices and technologies. The outcomes and impacts of agriculture research depend firstly upon disseminating the results of best practices to growers, and secondly providing support on how to implement these changes.

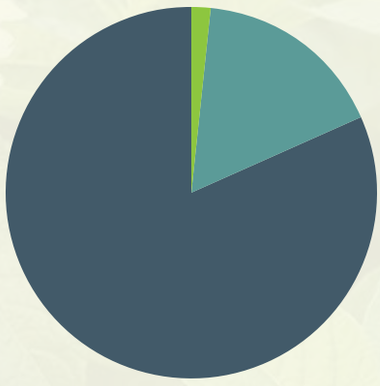
Research conducted locally is the best way for producers to implement best practices for potato production. If the research is completed outside Manitoba, there is potential that findings from the research will not be applicable to local growing conditions. Continued investment in Manitoba for potato research is necessary for production to flourish.

Building Capacity

165 summer students have been trained from funding received from Manitoba Agriculture, since 1985. This experience trains students in potato field research and provides financial support for them to pursue their education.

Graduate Students

Potato research has created home-grown expertise. The University of Manitoba has awarded:



M.Sc. *(49)* *PhD* *(10)* *M.A.* *(1)*

A majority of research has been conducted in the following departments:

- Plant Science
- Food and Nutritional Sciences
- Biosystem Engineering
- Entomology
- Soil Science
- Agribusiness and Agricultural Economics
- Environment and Geography

Research in Manitoba is a Good Investment

Canada's only starch processing plant

MSP Starch Products Inc.

Economic geography influences industrial growth. Manitoba's potato processors are physically clustered, providing the opportunity for MSP Starch Products Inc. in Carberry to become Canada's only starch processing plant currently in operation. MSP Starch Products Inc. is ideally situated close to some of the largest processing plants in Canada that produce a co-product from which they can isolate a food-safe starch.

Initially, when Earl and Derek McLaren purchased MSP Starch Products Inc. it produced non-food grade products. Through the insight of the McLaren brothers they researched processes and utilized contacts from the National Research Centre, the Food Development Centre in Portage la Prairie, and consulting firms that would permit food-grade quality starch to be developed. The factory then switched to high-grade human consumption processing.

The largest market for potato starch is gluten-free foods and the Edmonton based company Kinnikinnick Foods® exclusively utilizes MSP Starch Products Inc. In North America, peanut processors use potato starch in order to have their flavours stick to their dry roasted peanuts. MSP potato starch is also used in the shredded cheese industry to keep the cheese from sticking together or to the bag.

Rural Opportunities

In total, MSP Starch Products Inc. employs approximately 20 people from Carberry and the surrounding area. MSP Starch Products Inc. also contributes extensively to community investment, volunteering, and fundraising in Carberry, including contributing to: sporting teams, art councils, youth dances, the fire department, Ronald McDonald House Charities, and CancerCare Manitoba. The success of rural communities depends upon successful local business, and MSP Starch Products Inc. has positively impacted the citizens of Carberry and increased the economic growth of the Manitoba potato industry.

"We've had the privilege of being able to stay in our own local community. We are very proud to be able to create jobs right here."

— Earl McLaren,
PRESIDENT AND CEO

MANITOBA STARCH PRODUCTS

Future Growth

Manitoba's largest processors are investing in expanding the Manitoba potato industry

$460 Million

THE AMOUNT THE J.R. SIMPLOT COMPANY ANNOUNCED IN EARLY 2018 THAT IT WILL BE SPENDING TO EXPAND THEIR PREVIOUS PLANT TO MORE THAN DOUBLE THE PRODUCTION CAPABILITY.

$75 Million

THE INVESTMENT MCCAIN FOODS LIMITED ANNOUNCED TO UPGRADE THE CARBERRY AND PORTAGE LA PRAIRIE PLANTS.

90

THE ADDITIONAL NUMBER OF FACTORY EMPLOYMENT OPPORTUNITIES THE EXPANSION BY J.R. SIMPLOT WILL CREATE IN PORTAGE LA PRAIRIE.

Potato Farm Cash Receipts 1990–2017

$225 Million increase
from 1990-2017

Role of Research

"Manitoba Agriculture and the Federal Government are making significant investments in research for Manitoba's potato industry. These investments have helped increase productivity and quality of potato crops in Manitoba, making Manitoba more attractive to potato processors to increase processing capacity in the province."

— Dr. Vikram Bisht,
INDUSTRY DEVELOPMENT SPECIALIST, MANITOBA AGRICULTURE

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Manitoba

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Canada

SOURCES

PHOTO CREDITS: STAN WIEBE (PHOTOGRAPHER AND POTATO GROWER)

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