

Research and Innovation in Manitoba Grows the Hemp Industry



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Industrial hemp production in Canada was legalized in 1998.

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There were many unknowns about hemp agronomy and limited market opportunities for hemp products.

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Today, Manitoba is a leader in hemp innovations. New crop cultivars [a plant variety that has been produced in cultivation by selective breeding], maximize the productivity and profitability of hemp. Processing facilities create jobs and grow the sector.

Hemp is one of the world's most versatile plant materials. Food, clothing, insulation, automobile parts, cat litter and 'hempcrete' are just a few of the many variety of hemp uses.

Looking out over the Horizon

Possibilities exist when industry, government and researchers share a common vision of an extraordinary opportunity

In just over 20 years, hemp in Manitoba grew from nothing to a burgeoning industry. Industrial hemp was legalized in 1998, ending decades of prohibition, permitting Canadian farmers to begin growing the crop for commercial use. While still regulated by Health Canada, hemp could now be grown for food and fibre markets, processed and sold domestically or exported.

Manitoba producers quickly jumped on the opportunity, and several hemp-based fibre and food companies sprung up. The sector started with little—from producers unfamiliar with the

crop but willing to try, to experimental seed cultivars and an undeveloped market for hemp products.

After a rocky start, through research, government and industry collaboration, Manitoba farmers and companies quickly became leaders in hemp innovation.

Today, Manitoba is one of the world leaders in hemp foods and is developing a reputation for unique processing methods in hemp fibre.

In 2019 in Canada:

731

cultivation licenses approved by Health Canada



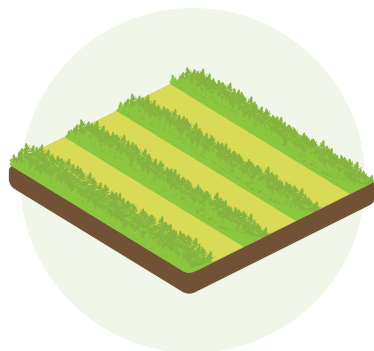
31

approved hemp cultivars grown for commercial purposes



37,545

hectares dedicated to growing hemp



25,000 Uses for this Versatile Crop

Hemp is a unique and highly valuable multi-use crop: it is not only good for eating but its fibre can be used widely for industrial purposes.

Hemp can be broken down into edible components—the seed and oil—or the hemp straw can be processed to yield fibre.

The seed, typically ‘dehulled’ by removing the shell, is called hemp hearts – a highly nutritious, complete protein, that contains healthy fats and is packed with vitamins and minerals.

The seed can also be cold pressed to extract a green oil packed with healthy hemp fats.

Industrial hemp production is regulated by Health Canada and is defined as a cannabis plant with a tetrahydrocannabinol (THC) content of less than 0.3%. It is not marijuana, which is a cannabis plant with high amounts of THC.

DID YOU KNOW?

It takes 90 - 120 days for hemp to grow to maturity.

Leaves and Flower

- More than 80 different compounds including CBD (cannabidiol) with antioxidant properties that help treat oxidation-associated diseases
- Hemp essential oils have a highly therapeutic aroma
- Raw hemp leaves are nutritious, full of antioxidants, and rich in digestible proteins

Seed

- Hemp hearts (seed without the shell)
- Hemp oil (extracted through cold pressing, a safe way to get the oil that also preserves the nutrients)
- Hemp powder (ground up seed)

Stalk

- Textiles (clothing, rope, shoes)
- Building materials (hempcrete, insulation)
- Paper, cardboard, plastics



Research stimulates Growth

When farmers first began trying to grow hemp, the agronomy of the crop was mostly unknown. The genetics of the hemp, the seeding dates and rates, plant fertility, harvest management—nearly everything was an open question.

The Manitoba Agriculture Diversification Centres—a group of applied research organizations working to improve Manitoba’s crops—has been a boon to growers who are able to access the latest findings on hemp agronomy. Through these centres, farmers have accessed hemp cultivars that improve the harvest index of the crops and reduce accidents such as combine

fires. They have also added critical knowledge on seeding dates and rates, the use of herbicides and fertilizers, growing conditions, and plant fertility.

“Manitoba farmers are dedicated to hemp and have more experience than anywhere in North America. There are big opportunities in Manitoba.”

— Lyall Bates
HEMP SENSE INC.



PCDF
PARKLAND CROP
DIVERSIFICATION FOUNDATION,
LOCATED IN ROBLIN, MB



PESAI
PRAIRIES EAST SUSTAINABLE
AGRICULTURE INITIATIVE,
LOCATED IN ARBORG, MB

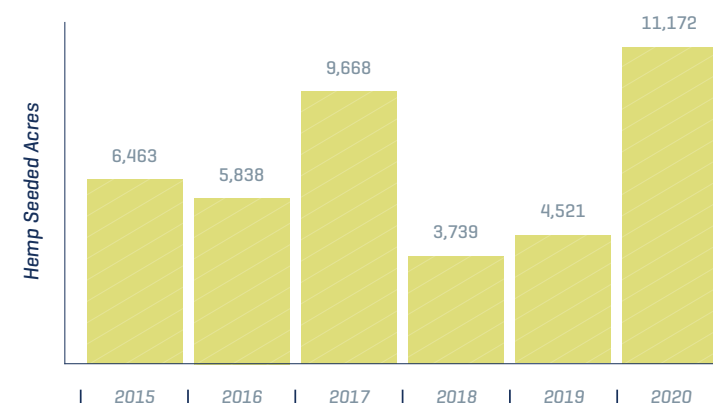


WADO
WESTMAN AGRICULTURE
DIVERSIFICATION ORGANIZATION,
LOCATED IN MELITA, MB



CMCDC
CANADIAN-MANITOBA CROP
DIVERSIFICATION CENTRE,
LOCATED IN CARBERRY, MB

Manitoba Hemp Seeded Acres, 2015-2020



\$12.5 Million

\$12.5 million of federal and provincial governments funding invested in the four Diversification Centres over the last 12 years.

Becoming truly Canadian

Innovation in hemp seed cultivars has uniquely adapted hemp to the Canadian climate

“If the demand is there, the farmers will grow it.”

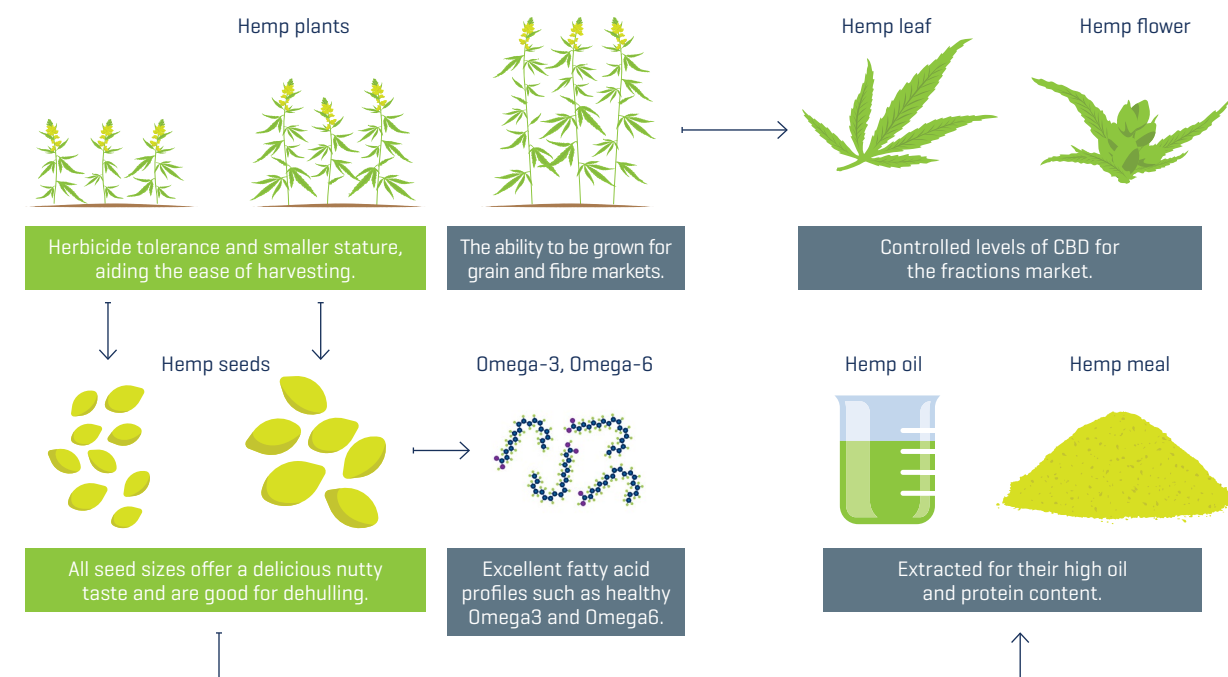
— Don Dewar
LOCAL HEMP PRODUCER

It all starts from the seed. In the late 1990s, imported hemp cultivars, not so well adapted to the Canadian climate, grew too tall and were unsuitable for the food and grain market. Twenty years of research and innovation in hemp cultivars have yielded seeds that grow into crops suitable for the grain or fibre markets—or both.

These hemp cultivars were developed through hard-working agronomists using conventional breeding and selection strategies to get the right hemp genes.

Manitoba pioneers and companies have collaborated across Canada to develop these cultivars—from the hemp food processors Manitoba Harvest and Hemp Oil Canada, to seed variety companies including the Manitoba Agriculture Crop Diversification Centres, the Parkland Industrial Hemp Growers, and Hemp Genetics International.

Research Produces New Hemp Cultivars that have:



TEXT MARKED IN GREEN IMPROVE THE HARVEST INDEX, WHICH IS THE RATIO OF GRAIN YIELD TO TOTAL ABOVE GROUND BIOMASS

Canada's Growing Hemp Lineup

Agronomists and farmers in Manitoba's Parkland Region were pioneers in the early development of new hemp cultivars

Parkland Industrial Hemp Growers in Dauphin, Manitoba have Registered:

In 2019, the top 3 most popular hemp cultivars grown in Canada, in terms of acres, were:

- **FINOLA [27%]**
- **X59 [25%]**
- **Katani [24%]**

These cultivars were developed by Hemp Production Services (HPS) of Saskatoon, Saskatchewan in collaboration with Manitoba players: the Parkland Crop Diversification Foundation, the Parkland Industrial Hemp Growers, Manitoba Harvest, and Hemp Oil Canada.

Several of the older cultivars developed by HPS include CRS-1, CFX-1, and CFX-2. These are all multipurpose dioecious cultivars, high in grain yield, and a kernel weight of 15 – 20 g/1000 kernels.

Newer, dual purpose cultivars have medium seed sizes and are also high yielding. These are Grandi, Katani, and Picolo, which is the shortest new hemp variety on the market.

Joey

- REGISTERED IN 2010
- DUAL-PURPOSE (FOOD & FIBRE)
- EASY TO GROW AND SUITABLE FOR BEGINNERS
- LARGE SEEDS AND HAVE HIGH GLA CONTENT, 5.1% (AN OMEGA-6 FATTY ACID)

Canda

- REGISTERED IN 2010
- DUAL-PURPOSE (FOOD & FIBRE)
- SEEDS HAVE AN EXTREMELY HIGH, 7.9% GLA CONTENT
- USED FOR CBD PRODUCTION ACROSS CANADA

Petera

- REGISTERED IN 2007
- DEVELOPED FOR THE FIBRE MARKET, THE CULTIVARS HAS A HIGH FIBRE YIELD (6-8 TONNES PER ACRE)
- GROWS 10-12 FEET

DID YOU KNOW?
The Parkland Industrial Hemp Growers were one of the first to the scene, beginning their hemp breeding program in 2002.

Leveraging Research into Profits

Manitoba has the largest hemp processing facilities in Canada

Manitoba is a World Leader

Manitoba is the world leader in hemp foods. Pioneering Manitobans built the sector from nothing in 1998, forming two important hemp food companies: Manitoba Harvest and Hemp Oil Canada. In 2015 Manitoba Harvest and Hemp Oil Canada merged under the same umbrella company, uniting them as the leading force in hemp foods worldwide.

The creation of Hemp Oil Canada and Manitoba Harvest resulted in the opening of Canada's first facilities devoted to processing hemp seed. Both companies were able to coexist, with Hemp Oil Canada focusing on bulk hemp ingredients and Manitoba Harvest creating brand products to sell in stores. At the time, the companies had a limited market seeking to create new products for consumers. Few large corporations wanted to dive into the hemp food business, leaving the smaller players to take the initiative—a grassroots effort.



HEMP OIL CANADA FACILITY - STE. AGATHE, MANITOBA
COMPLETION OF THIS FACILITY TRIPLED THE COMPANY'S PRODUCTION CAPACITY.

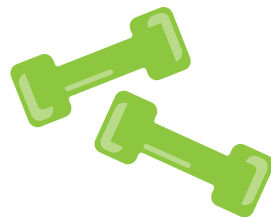


DID YOU KNOW?

3 tbsp of hemp hearts equals:

Calories
180

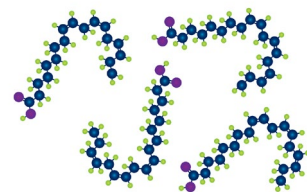
180 CALORIES



10G OF PROTEIN



20% DAILY IRON INTAKE, 25% THIAMIN, 45% MAGNESIUM, 100% MANGANESE



12G OF HEALTHY FATS, INCLUDING THE OMEGA-6 GAMMA-LINOLENIC ACID (GLA) AND THE OMEGA-3 ALPHA-LINOLENIC ACID (ALA)



NO CHOLESTEROL, NO TRANS FATS, NO SODIUM, FEW CARBOHYDRATES

Hemp Foods in Manitoba

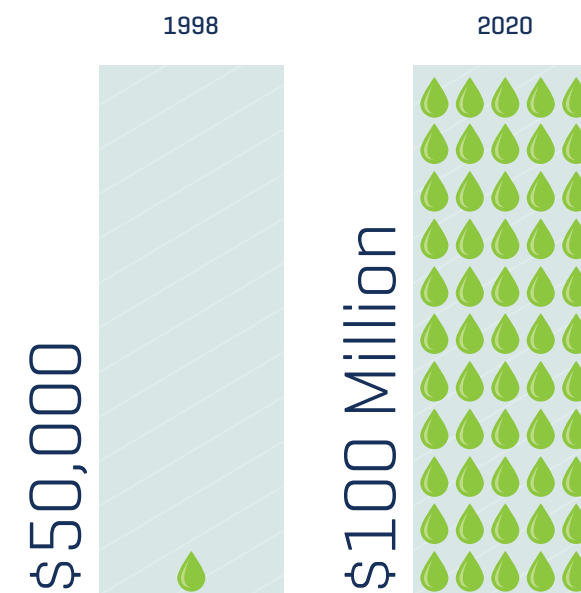
Both companies began by diving into the hemp oil market before diversifying into other areas. Manitoba Harvest now carries a long list of hemp-based products, from granola bars and hemp butter, to cereals and hemp hearts. Hemp Oil Canada has pushed into the hemp ingredients market—hemp hearts, oil, and powders—taking advantage of hemp's multiple purposes.

Approximately 85% of research and development run by Hemp Oil Canada has been supported by government research grants. Manitoba government invested more than \$422,000 towards research and innovation in hemp food and fiber since 2004.

Manitoba Harvest has received six figure grants from the National Research Council's Industrial Research Assistance Program (IRAP) alone. Both Manitoba Harvest and Hemp Oil Canada also leveraged the expertise of the Food Development Centre, a food innovation facility in Portage la Prairie, Manitoba.

"The hemp industry is truly a grassroots effort. There were no big players involved. The industry couldn't have gotten to the level it has without research and development supported by the Manitoba government. Together, we went from zero to an industry valued at several hundred million—and that's only hemp foods alone."

— Shaun Crew
HEMP OIL CANADA



Manitoba Harvest sold \$50,000 worth of hemp oil in 1998, their first year of operation, before growing to over \$100 million in revenue in 2019. Their products sell in 16,000 stores worldwide.

20% Hemp Oil Canada averages an annual growth of 20%, and has doubled in size every two years since 2010.

100 < Hemp Oil Canada and Manitoba Harvest grew from a few cofounders to over 100 employees.

A new Hemp Oil Canada facility built in 2015 tripled the processing capacity of the company and added jobs.

Hemp Fibre in Manitoba

Innovative Products to Access New Markets

Based in Gilbert Plains, Manitoba, Hemp Sense Inc. is a hemp fibre processing company interested in capturing the value of hemp stalk using their patented zero waste process. After touring hemp facilities around the world, in 2008 Lyall Bates brought his knowledge of hemp processing back to Manitoba. There, he incorporated Hemp Sense in 2015, and by 2017, the company opened a 30,000 square foot processing plant.



HEMP STALK WITH THE BARK (BAST FIBRE) PULLED BACK TO EXPOSE THE INNER CORE (HURD).



THE HEMP SENSE INC. FACILITY IN GILBERT PLAINS, MANITOBA.

Weaving Residue Straw into Gold

Most hemp fibre is left in the field after the harvest, and often only 15% is used for processing.

Hemp Sense Inc. takes residue straw from harvesting, including the bast and hurd, and processes it to make a portfolio of products. They shred the straw to make pellets, or further processes it to make cat litter, gardening and lawn repair supplies, pet food and bedding. The products capitalize on hemp's naturally absorbent properties.

Made from hemp



Hemp Sense Inc. is Recognized Worldwide, with Demand from Several Countries for the Company's Products

Four patents and one pending:

- Patented process to shred whole hemp stalks.
- Patented process to create pellets from the whole stalks fiber and hurd.
- Patented process to make pellets from CBD biomass.
- Patented process to separate buds and leaves from bales.
- Patent pending process to harvest the tops of buds and leaves.

Hemp Sense Inc. is the first facility in the world to take 100% of the whole hemp crop, including the fibre, hurd, seed, hulls, and CBD biomass.

"When we started this, it was never done before. We went to Europe and they were separating the fibre and hurd. Most of those companies were going broke. In fact, all of them we could find were in trouble. But we came back and figured out how to make it work. We get calls now from Alberta, Saskatchewan, Ontario, and even the States to bring their hemp bales to our facility for processing."

— Lyall Bates
HEMP SENSE INC.

Manitoba among the Leaders in Hemp Exports

Manitoba has played a critical role in developing Canada's hemp economy, and at the same time has made an international impact on this small but growing sector

In 2019

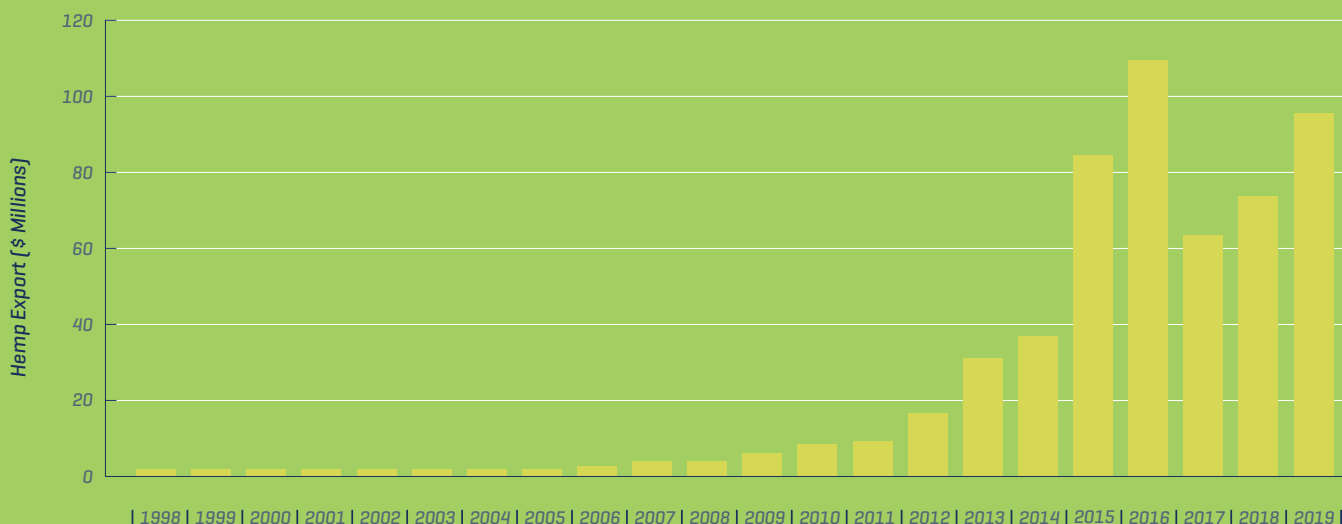
Manitoba produced 764 pounds of hemp seed per acre, the third highest in Canada.

The province also exported 11,300 metric tonnes of hemp products, mostly to the United States, totaling almost \$96 million.

Total hemp exports have increased since hemp's legalization, particularly since 2010 *(see graph below)*

The early investment from farmers, entrepreneurs, and processors into hemp has given Manitoba a competitive edge, with several pioneering companies calling Manitoba home. The province has a strong footing in hemp seed cultivar development, due to efforts from the parkland region of Manitoba, including the Parkland Industrial Hemp Growers. Through early investments, Manitoba entrepreneurs have been able to take a relatively unknown crop fraught with risk and developed it into commercially viable products worth hundreds of millions of dollars in 20 years.

Manitoba Hemp Exports



Data obtained from Manitoba Agriculture and Resource Development.

The Pace of Growth to Come

In just over 20 years, the hemp market went from \$0 to over \$200 Million annual sales in Canada

Broader Market Development is Key for the Hemp Industry To Grow at a Higher Pace



Food

Already a strong sector, new standards in hemp foods could boost profitability within domestic and international markets.



Fibre

An underused by-product today, the hemp fibre sector holds tremendous market potential. A more consistent fibre supply is required to attract investment and grow Manitoba's hemp fibre processing capacity.



Fractions

Hemp flowers and leaves contain CBD, which has shown early evidence of improving sleep disorders, pain and anxiety. Although CBD poses a much lower risk than THC, current regulations restrict its collection and sale to licensed and regulated processors and retailers. Relaxing federal regulations would be a safe and effective way to increase the competitive advantage of Canadian hemp internationally.



Feed

Hemp is not yet approved as livestock feed in Canada, although it can be used as bird food. Opening the hemp market to the livestock sector would reduce risk in growing hemp, further stabilizing the supply chain by providing another avenue to sell the hemp.

THE CANADIAN HEMP TRADE ALLIANCE (CHTA) HAS CREATED A BLUEPRINT FOR THE INDUSTRY TO GROW, PROVIDING PLANS TO DEVELOP FOUR KEY REVENUE STREAMS.

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SOURCES

PHOTO CREDIT: PARKLAND INDUSTRIAL HEMP GROWERS

PHOTO CREDIT: SHAUN CREW

LOGO CREDITS: MANITOBA AGRICULTURE DIVERSIFICATION CENTRES

STATISTICS CANADA

MANITOBA AGRICULTURE AND RESOURCE DEVELOPMENT

HEALTH CANADA. INDUSTRIAL HEMP LICENSING STATISTICS. [HTTPS://WWW.CANADA.CA/EN/HEALTH-CANADA/SERVICES/DRUGS-MEDICATION/CANNABIS/PRODUCING-SELLING-HEMP/ABOUT-HEMP-CANADA-HEMP-INDUSTRY/STATISTICS-REPORTS-FACT-SHEETS-HEMP.HTML](https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/producing-selling-hemp/about-hemp-canada-hemp-industry/statistics-reports-fact-sheets-hemp.html) ACCESSED OCTOBER 12, 2020.

GOVERNMENT OF CANADA. CANNABIDIOL (CBD). [HTTPS://WWW.CANADA.CA/EN/HEALTH-CANADA/SERVICES/DRUGS-MEDICATION/CANNABIS/ABOUT/CANNABIDIOL.HTML](https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/about/cannabidiol.html) PUBLISHED 2020. ACCESSED OCTOBER 11, 2020.

MANITOBA AGRICULTURE AND RESOURCES DEVELOPMENT. INDUSTRIAL HEMP SECTOR PROFILE AT A GLANCE. 2020. [HTTPS://WWW.GOV.MB.CA/AGRICULTURE/MARKETS-AND-STATISTICS/CROP-STATISTICS/PUBS/AG-SECTOR-HEMP-ACCESSIBLE.PDF](https://www.gov.mb.ca/agriculture/markets-and-statistics/crop-statistics/pubs/ag-sector-hemp-accessible.pdf)

MANITOBA AGRICULTURE AND RESOURCE DEVELOPMENT. ABOUT US - DIVERSIFICATION CENTRES. [HTTPS://WWW.GOV.MB.CA/AGRICULTURE/RESEARCH-AND-INNOVATION/DIVERSIFICATION-CENTRES/ABOUT.HTML](https://www.gov.mb.ca/agriculture/research-and-innovation/diversification-centres/about.html) ACCESSED SEPTEMBER 22, 2020.

FARINON B, MOLINARI R, COSTANTINI L, MERENDINO N. THE SEED OF INDUSTRIAL HEMP (CANNABIS SATIVA L.): NUTRITIONAL QUALITY AND POTENTIAL FUNCTIONALITY FOR HUMAN HEALTH AND NUTRITION. *NUTRIENTS*. 2020;12(7):1-60. DOI:10.3390/NU12071935.

TILRAY INC. TILRAY TO ACQUIRE MANITOBA HARVEST, THE WORLD'S LARGEST HEMP FOOD COMPANY. [HTTPS://IR.TILRAY.COM/NEWS-RELEASES/NEWS-RELEASE-DETAILS/TILRAY-ACQUIRE-MANITOBA-HARVEST-WORLDS-LARGEST-HEMP-FOOD](https://ir.tilray.com/news-releases/news-release-details/tilray-acquire-manitoba-harvest-worlds-largest-hemp-food) ACCESSED MARCH 3, 2020.

SAWATZKY B. HEMP OIL CANADA : FROM RAGS TO RICHES. [HTTPS://NIVERVILLECITIZEN.COM/NEWS/LOCAL/HEMP-OIL-CANADA-FROM-RAGS-TO-RICHES](https://nivervillecitizen.com/news/local/hemp-oil-canada-from-rags-to-riches) PUBLISHED 2020. ACCESSED OCTOBER 12, 2020.

AMES, DUSTIN AND SOMMERSELL, NECOLE. 2020. RESEARCH MANITOBA. THE IMPACT OF RESEARCH AND INNOVATION ON MANITOBA'S HEMP INDUSTRY. WINNIPEG, MB.

