



Parkland Agricultural Resource Co-op | **MARKET PROFILE**

Hemp Processing



PARC

Parkland Agricultural
Resource Co-op

The PARC Region

The Parkland Agricultural Resource Co-op (PARC) encompasses eight municipalities in the Parkland Region Trade Corridor of west central Manitoba. A group of farmers and businesses has already been formed with the intent to support a strategic development project so there is potential for coordination between the farmers and investors.

Industrial Hemp Processing Opportunity

The PARC region is becoming a centre of excellence for industrial hemp production and processing. It has many of the essential components needed to create a hemp business cluster that is strengthening the region's already robust competitive position; such as approximately 75% of Manitoba production is within a 100 km radius of experienced growers, seed development and variety trials. The hemp business cluster will build upon the established relationships with companies, specialized suppliers, service providers and associated institutions that are active stakeholders in developing industrial hemp in Manitoba. The cluster will not only increase the productivity and open markets with which companies can compete in North America and beyond, but will also reduce the cost of doing business in the PARC region.

Manitoba has developed extensive knowledge in production, research and development of industrial hemp for seed and fibre. There are business opportunities that support custom farm services, seed processing and storage, research and development in Cannabidiol (CBD), and hemp fibre and hurd processing. There are more than 25,000 uses of industrial hemp fibre ranging from textiles, composites, building products, automotive parts, renewable fuels and so much more. The seed can be dehulled for food use or crushed into oil for food, pharmaceutical-grade natural medicine (CBD), industrial additives and other uses.

The PARC Advantage

- Exceptionally strong regional, provincial and federal research and development collaboration opportunities that support agriculture and processing.
- Largest concentration (75%) of high quality industrial hemp production in Manitoba with average to above average yields
- Farmers have 15 years of specialized skills development for planting, harvesting and all aspects of production
- Strategic alliance with farmers and the regional community
- Excellent transportation infrastructure to provide flexibility to reach markets
- Life style to attract and retain skilled workers

A Centre for Industrial Hemp

- Excellent and large volume of high quality hemp for seed and straw supplies
- Proximity to Saskatchewan hemp to reduce supply risk
- Good transportation infrastructure
- Regional surplus rail capacity to provide service
- Local crop research variety trials with the Parkland Crop Diversification Foundation (PCDF)
- Accessible and affordable supplies of:
 - electricity (Manitoba Hydro offers one of the lowest electricity rates in North America);
 - natural gas; and
 - water.
- Skilled and semi-skilled workforce – post-secondary training is available locally and several agencies provide assistance with additional training requirements.
- Industry programs to assist agricultural processing businesses
- Government departments such as Manitoba Trade and Investment to assist Manitoba firms to become export ready, enter new markets outside of Manitoba and diversity in existing markets
- Research and development programs supported by industry, associations and the government
- The Manitoba-based Canadian Hemp Trade Alliance (CHTA) is the national association in Canada that supports further development of hemp products and businesses. Its members represent the key players in the development of the industry in Canada and is the voice of its members in the United States and abroad. The Alliance represents those involved in Canada's hemp industry including; farmers, processors, manufacturers, researchers, entrepreneurs and marketers. The CHTA will be announcing research into food using hemp in 2014. The CHTA has proposed changes to existing legislation in Canada November 2013 that anticipates that extracts can be made from hemp.

Research in Manitoba

Manitoba is home to several internationally recognized research and development centres and the national association for industrial hemp which are all located within a short distance of the region.

- **Composites Innovation Centre (CIC)** is an innovative research, development and prototyping facility that supports the application of composite materials and technologies for manufacturing industries such as aerospace, bio-materials, ground transportation, and civil infrastructure. Core activities are design and analysis, prototyping, testing, process development, project management and business planning. Through demonstration of biocomposites in automotive, agriculture and industrial applications, development of global leading agricultural fibre testing and grading capabilities and

facilitating business feasibility analyses, this centre is very active in assisting companies in commercializing bioproduct opportunities.

- **Richardson Centre for Functional Foods & Nutraceuticals** has a pilot plant program for primary processing. They also have a baking lab and can assist with analytical studies.
- **Food Development Centre** has a pilot plant program, can assist with research and development, nutritional labelling and other services to bringing new products to market.
- **Manitoba Agri-Health Research Network** supports the commercialization of research supported functional foods, food ingredients and natural health products in Manitoba through project coordination, communications, global outreach and test market services.

Industrial Hemp Production – Industry Overview

The industry grows about 20% per year and it is expected that hemp production will continue to increase within the PARC region to meet the growing demand in the food and fibre markets.

Manitoba is a significant player in Canadian hemp production as shown below. Its share of total Prairie production has ranged between 31% and 59% in recent years. Manitoba's position is strengthened by the presence of experienced growers and major processors for seed and fibre.



Canadian Estimated Industrial Hemp Acres

Year	Acres in MB	Acres in AB	Acres in SK	Total Prairie Acres	MB % of Prairie Acres
2005	12,000	2,263	8,470	22,733	53%
2006	29,000	5,194	14,882	49,076	59%
2007	4,400	3,594	5,664	13,658	32%
2008	2,452	1,438	3,796	7,686	32%
2009	4,900	1,932	5,091	11,923	41%
2010	9,381	5,152	10,409	24,942	38%
2011	11,352	15,892	9,944	37,188	31%
2012	15,709	—	—	—	—

The 2012 Canadian industrial hemp crop was estimated at 54,000 acres by Manitoba Harvest Hemp Foods (MHHF). About 90% of those acres are in the Prairies with MHHF contracting roughly half of the total Canadian Hemp acres.

The estimated Canadian hemp acreage in 2013 was 66,671 acres and between 95,000 and 100,000 acres in 2014. In 2013, Canadian hemp exports approached \$40,000,000.

Industrial Hemp Supply & Pricing

On March 12, 1998 the Canadian Federal Government lifted a 60 year ban making it legal to grow hemp in Canada. Health Canada issues licenses for approved research studies and to growers related to the planting and cultivation of hemp for industrial purposes. Industrial hemp in the Parkland is grown in rotation with other traditional crops as an agricultural crop for seed and fibre.

Industrial hemp has less than 0.3% of delta-9 tetrahydrocannabinol (THC) and can grow up to 5 metres (16 ft) in height. The THC is found in the glandular hairs on the leaf, stem and the unfertilized female flowers. The plant has both male and female plants. The male plants dies soon after flowering while the female plants live to mature seed stage.



photo: Manitoba Harvest Hemp Foods

Manitoba Estimated Industrial Hemp Acres

Year	Harvested acres in MB	Average grain yield per acre (lbs) in MB	Production ('000 lbs)	Price (\$/lb.)	Total value (\$'000)
2005	12,000	550	6,600	0.55	3,630
2006	29,000	650	18,850	0.50	9,425
2007	4,400	458	2,015	0.50	1,008
2008	2,452	506	708	0.55	390
2009	4,900	665	3,295	0.60	1,955
2010	9,381	468	4,390	0.70	3,073
2011	11,352	533	6,051	0.80	4,840
2012	15,709	795	12,489	n/a	n/a

Source: Manitoba Agriculture, Food and Rural Development; Manitoba Crop Insurance seeded acreage reports

Producers are only allowed to plant certified seed—there is no “common” seed. All hemp planted must be an approved variety by Health Canada and all must contain less than 0.3% THC in the field. Health Canada maintains an annual seed list. Some of the common varieties include; Alyssa, Anka, Canda, Delores, CRS-1, CFX-1, CFX-2, Finola, and X59.

Shorter varieties are more suited to grain production. Mid-height varieties may be suitable for both grain and fibre production while the tallest varieties may be suitable for fibre-only production.

Hemp has been an attractive crop for PARC area farmers. In the last decade (2000 to 2010) yields in the area generally ranged from 400 to a high of 1,200 pounds per acre with most yields being in the 600 to 700 pound per acre range. Cost of production will vary with individual operations and circumstances. Average operating costs for hemp seed per acre were estimated at \$141.20; fixed costs at \$59.04; giving total estimated costs of \$203.36 per acre. The break even yield was estimated to be 406 pounds per acre. Hemp yields can vary greatly and hemp plants do not withstand flooding.

Recent hemp seed production contract prices ranged from \$0.75 to \$0.90 cents per pound of clean seed. Organic production price is generally 30 to 40% higher (from \$1.10 to \$1.20). The increased production has been in response to the growing demand for grain and processed products. 2006 saw an acreage jump due to increased contracting, high yields, economics and non-contracted production. 2007 saw a drop of acres due to the carry over inventory and the positive economics of producing other more traditional crops. Acres were in demand in 2012 and contracted by processors. This data is created in November of each year and may be subject to change.

Hemp Business Cluster – Competitive Advantage

Many of the essential components needed to create a cluster are present which could strengthen the region's already strong competitive position.

The region already has three significant components from which to develop a hemp business cluster:

- Parkland Industrial Hemp Growers (PIHG)** is a member co-op of farmers that grow industrial hemp for grain and fibre markets. PIHG started an industrial hemp plant breeding program in 2002 to supply locally adapted hemp varieties to Manitoba and other parts of Canada. At present PIHG has 6 registered industrial hemp varieties suitable for grain-only, grain & fibre, or fibre-only production. PIHG has also facilitated production contracts for growers.
- Parkland Crop Diversification Foundation (PCDF)** is a Parkland based applied crop research organization that cooperates with farmers, industry, 3 similar Diversification Centers in the province and other research institutions such as AAFC and Universities that does similar research. PCDF supports rural entrepreneurs and farm businesses with small plot research information on crops and cropping programs that will lead to new crop developments, diversification and value-added opportunities to the rural economy.
- Plains Industrial Hemp Processing (PIHP)** incorporated in 2010 and specializes in fibre and hurd to several markets including animal bedding, absorbency products for various industries, matting, hurds for hempcrete building material, renewable BBQ pellets and other products utilizing short and long fibre and hurd sizes. As North America's largest fibre processor, the company markets under the registered trademark Plains Hemp, and is a bulk wholesaler and a custom private label packager. The company is actively working with researchers on product innovation to enter new business sectors.

The presence of these organizations creates opportunities for value-added food processing of the seed, and industrial uses for the fibre.

The region produces large quantities of hemp seed and hemp straw. Industrial hemp is a source of both food and fibre. The hemp straw, because of its bulky nature and high costs to transport, requires local processing which supports value-added industries and enhances the development of rural infrastructure. While the seed processors are located



in the Winnipeg area, they provide information meetings and contract with local farmers. Their agronomists work with farmers to ensure the seed and fibre are fully valued.

Hemp Oil Canada Inc was incorporated in 1998 and specializes in supplying bulk wholesale quantities of a range of ingredient products to industrial manufacturing customers who incorporate them their finished products. Today, it is one of the world's largest bulk wholesale producer, private label packager, and custom processor of hemp food products and certified organic ingredients from its allergen-free and FSSC 22000 certified facility. The company exports globally to more than 15 international destinations including the European Union, UK, Asia, South Africa, and throughout North America.

Manitoba Harvest Hemp Foods was founded in 1998 and produces fresh hemp oil and shelled hemp seeds. Manitoba Harvest controls every aspect of the production process from sourcing crops, to food processing, packaging and distribution. Manitoba Harvest purchases hemp seed direct from hemp farmers and makes fresh in-house products Manitoba Harvest's state-of-the-art kosher and organic certified facility in Winnipeg. Today, Manitoba Harvest is the largest vertically integrated hemp food manufacturer in the world.

Market Opportunities

Industrial hemp can be processed completely into thousands of various products



photo: Manitoba Harvest | Hemp Foods

Industry Support

- **Custom farm services** – including swathing and baling operating, specialized seed cleaning and trucking (bringing hemp straw and seed to processing facilities and finished goods from the plant to intermodal terminals or end use markets) are necessary.
- **Plant breeding** – Interest in dual-purpose varieties that are ideal for seed and fibre with very low or no THC. Analyze and compare varieties for grain and fibre yield, oil and fibre percentage, seeding rate trial and seed treatment trial. Due to its “illegal” status in many parts of the world, hemp is not nearly as developed as other mainstream crops such as wheat, canola, and corn. Seed for planting must be purchased from a registered seed grower.

Seed

Hemp oil and hemp seeds have numerous beneficial properties. Extracts to be used in thousands of ingredients for example; hemp oil, food & beverage products, dehulled hemp seed, cosmetics, industrial additives like paint, fuel and ink.

- Pressed hemp seeds are approximately 30 to 35% oil by weight.
- Hemp seed meal has recently found a use in the brewing of specialty hemp beers.
- Dehulled hemp seed has add essential omegas and extra protein into the daily diet, are **vegetarian and vegan**

friendly and are not genetically modified. The farming practice can be **kosher certified, pesticide-free and certified organic**.

- **Hemp protein** contains all essential amino acids making it particularly vegan friendly. It’s also easy to digest as hemp easily assimilates into the body. The seed cake is about 25% protein. The hemp seeds also have marketable protein and fiber profiles that add to hemp’s overall profitability.
- Hemp seed contains oil that is of interest for its nutritive properties, including a favorable balance of **Omega-6 and Omega-3 fatty acids, including the rare form of gamma-linolenic acid (GLA)**. **Antioxidants** help maintain heart health and healthy cholesterol/blood pressure levels and aid in maintaining proper hormonal balance. The essential fatty acids (EFAs) in hemp are both short and long chain making for a broader spectrum.
- Hemp contains **other nutrients** such as vitamins B and E, folic acid and phosphorus, potassium, magnesium and calcium, which are involved in energy metabolism, protein and bone synthesis.

Natural medicine

Cannabidiol (CBD) is a compound found in industrial hemp varieties. Research is underway in North America and around the world to determine how the compound can be prepared in a pharmaceutical-grade product. Trials have shown patients of all ages with severe medical issues to have found a number of significant health benefits. Researchers are currently analyzing CBD for a number of health benefits. Health care markets are interested because the oils contain significant amounts of unsaturated fatty acids that make them ideal for health care industry.

Hemp Fibre & Hurd

Industrial hemp is a high volume renewable source of quality fibre that is well suited for supplementing or substituting for non-renewable sources of fibre in a wide range of markets such as paper, insulation, composites, the horticultural industry, textiles, biomaterials, construction materials, automotive composite panels, rope, paper etc. The ability to use the whole hemp plant creates significant potential to use hemp as a feedstock in the emerging bio-economy.

Described below are examples of value-added applications of hemp biomass (fibre and hurd) in the composite, green building and textile markets.

Thermoplastic Nonwoven Mats

These mats are formed by blending thermoplastic fibres (polypropylene, polyethylene, PLA, etc.) in the range of 30-50% with decorticated hemp fibre 3-8 cm long and consolidated by either thermal or mechanical methods. The mat is then typically combined in a layup consisting of a carpet backing, foam pad, scrim material(s) and joining adhesive by means of heated press-forming in a two-sided mould cavity. Typical applications include automotive headliners, trunk liners and inner door panels, and interior cabin components of agricultural equipment, heavy machinery and small aircraft.



Nonwoven Mats for Thermoset Composites

These composite reinforcements consist of clean, short to medium length fibre (3-8 cm) and are typically produced by common textile forming methods such as airlay, cross-lapping, needle punching and thermobonding. Due to trends in composite manufacturing, these mats are developed and produced such to facilitate closed-moulded liquid composite manufacturing techniques such as Resin Transfer Moulding (RTM), Vacuum assisted Resin Transfer Moulding (VaRTM) and Closed Cavity Bag Moulding (CCBM). To date these materials have been developed and trialed in numerous non-structural and semi-structural applications such as exterior bus, farm equipment and automotive panels, doors, shrouds and fenders.



Ceiling Tiles

The inner woody core of the hemp plant called hurd, constitutes approximately 65-70% of the total hemp stalk. Due to the low density, unique look and favourable acoustic



properties of the hemp hurd, a suitable application for this material is as an aesthetic ceiling tile. The tiles are formed by bonding a “slurry” of hurd and adhesive or resin under elevated heat and pressure.

Structural Building Blocks

Hurd (and short fibre) may also be utilized as a green building construction material such as in a hempcrete block. Hempcrete is a mixture of hemp hurd and lime (calcium oxide) and may be poured into forms or produced as blocks. Hempcrete is easy to work with (due to its very low density relative to concrete), acts as an insulator and as a moisture regulator. Hempcrete however, has very low compressive strength relative to concrete.



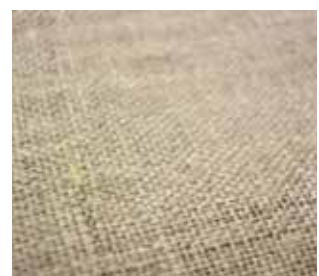
Insulation

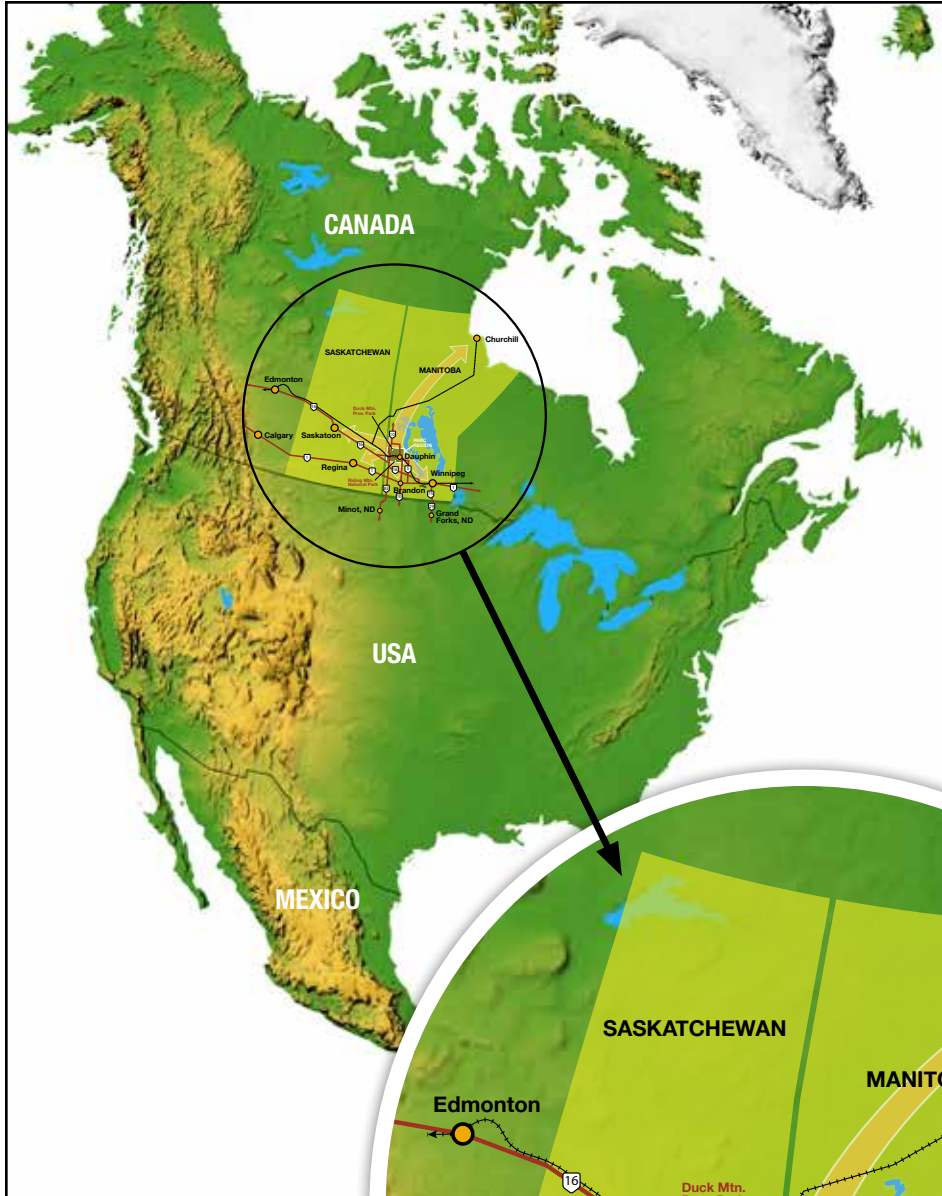
Hemp fibre may also be turned into batts for use as insulation in wood frame walls, ceiling and attics. The batts could consist of entirely hemp fibre, but more likely is blended with a thermoplastic fibre to thermally consolidate the batt, and a fire retardant additive included to meet applicable building material construction code. Hemp fibre insulation is very user friendly (relative to fibreglass), has a low thermal conduction coefficient (R-Value) and has high moisture permeability (can absorb up to 20% of its weight in moisture without any deterioration in its thermal performance).



Textiles

Hemp fibre for textiles is in great demand in China and parts of the European Union (EU). Long fibres, 30 – 60 cm, are turned into yarns, orientated fabrics and wovens, which then may be utilized in a wide array of textile applications. Hemp fibre has a long history as a textile fabric due to its inherent strength and ruggedness, resistance to UV light, mold and mildew, breathability and comfort.





Central Location

The PARC region is located in west-central Manitoba near the Saskatchewan border, about 75 minutes straight east of Yorkton, Saskatchewan, 350 kms north west of the provincial capital of Winnipeg and just north of the US Commercial Custom Clearance border crossing at Emerson/Pembina.

The region is fully accessible with RTAC provincial highways leading in all directions, rail lines, a regional airport and close proximity to Canada's only northern ocean port. The distribution system is established with modern conveniences.



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