



Market Research Report: A Maritime Industrial Hemp Product Marketing Study

A. Background

Industrial hemp, sometimes referred to as marijuana's misunderstood cousin, has less than 0.3% THC (the psycho-active ingredient) whereas the illegal crop has THC levels ranging much higher. Following a 60-year ban, it became legal to grow hemp in Canada on April 1, 1998, under license from Health Canada under Bill C8.

B. Study Objectives

The primary objective of the research is to gather statistical and market information on industrial hemp to provide:

- a situational analysis or profile of the industrial hemp industry in Canada and around the world;
- insight into Maritime opportunities for hemp production and processing;
- document the economic viability of the crop;
- identify new or emerging value-added opportunities and challenges that may or may not influence the competitiveness of a Maritime industry; and,
- provide recommendations concerning the future development of the industry in the Maritimes.

C. Methodology

C.1 Data Collection

We conducted an extensive literature search and contacted knowledgeable industry participants and observers (a contact list is found in [Appendix H](#)).

C.2 Disclaimer

This study relied heavily on information from key contacts and reports that are publicly available. It depicts the Canadian hemp industry as of the writing of this report and to the best of our knowledge based on available information.

Considerable research, product and market development is underway that will address many of questions and issues raised within this paper. Readers are reminded hemp is in a dynamic stage of development. Which products and markets, if any, will ultimately prove to be commercially viable is still an open question. Many government agriculture personnel agree they have never before seen the level of hype surrounding a new crop as has occurred with industrial hemp, *Cannabis sativa L.* (hereafter referred to as simply hemp).

D. Hemp in North America: A Brief Look Over Time

- Hemp has been used as a food grain and as a source of fibre for fish nets, clothing and rope for thousands of years and is documented as early as 2700 BC in ancient Chinese writings.
- Hemp was so important to the navies of England and the American colonies that farmers were legislated to dedicate a portion of their farm lands to produce hemp each year. It was first cultivated in Canada at Port Royal, Nova Scotia, in 1606.
- Hemp was a popular crop in Eastern and Central Canada throughout the 18th and 19th centuries. The Canadian Department of Agriculture conducted extensive research into the agronomics, processing and crop improvement across Canada in the 1920s and 1930s.

- Commercial hemp acreage in Canada declined over this period (from a high of 1,640 acres in 1928 to zero by 1934) due to the high cost of production, strong competition by other fibre crops produced in the tropics and the emergence of the first synthetic fibres.
- In 1938, the cultivation of *Cannabis sativa L.* became illegal in Canada under the Opium and Narcotics Act. In the U.S., the 1937 Marijuana Tax Act banned hemp production in the U.S. A small amount of production continued during the 1939 to 1945 war period.
- Canadian research into hemp production was re-established in 1994 when Joe Strobel and Geof Kime of Hempline Inc. in Ontario were granted a research license. To date, only a handful of states have been granted research licenses in the U.S. (for example, Hawaii and Vermont) and the crop remains an illegal species for commercial production in all states.
- Hemp research was conducted in Ontario, Manitoba, Saskatchewan and Alberta in 1995 and with the exception of Saskatchewan, again in 1996. In 1997, these same four provinces as well as Quebec and British Columbia grew hemp on a trial basis.
- 1998 is the first year both research and commercial licenses have been granted in Canada, thanks to the approval of the new Hemp Regulation under the Controlled Drugs and Substances Act which was enacted in March 1998. These regulations also apply to the processing, importing, exporting, sale and the distribution of hemp.
- Hemp has now been planted in all provinces except Newfoundland and Labrador.
- The Health Protection Branch of Health Canada is charged with enforcing legislation concerning hemp.
- Some of the requirements for a commercial license include the use of OECD (Organization of Economic Cooperation and Development), approved seed minimum acreage (10 acres), a police check of the applicant, GPS (global positioning system) coordinates of growing location, sampling and testing, and whether the crop is to be grown for the fibre and/or seed. Separate applications are required for each growing season.

E. Production

E.1 World Production

- World production of hemp fibre and tow has fallen from over 300 thousand tonnes in 1961 to 69 thousand tonnes in 1997. China accounts for the lion's share (36%) of production (see Figures A.1 and A.2 in Appendix A). China, and a number of other major producers, provide subsidies to hemp growers which keep prices artificially high. Yield varies considerably across countries.
- World hempseed (grain) production fell from 80 thousand tonnes to 37 thousand tonnes over this same period. Again, China makes up the bulk (73%) of world production (see Figures A.3 and A.4 in Appendix A). Production in China increased sharply in the mid-1980s, the influx of grain on the world market depressed prices. A recent report suggests once China ceased exporting, prices rebounded (Vantreese, 1998).
- Following this long period of decline, production of both fibre and tow and hempseed has increased in recent years. While the bulk of this occurred in China and France, Eastern Europe's production has also increased, a function of the end of the ban on hemp cultivation in the United Kingdom in 1993, in Germany in 1995, increased demand for natural products by consumers and bio-degradable materials for manufacturing industries and the existence of substantial farm subsidies.

E.2 Canadian Production in 1998

Canadian hemp cultivation is in its fifth year with 1998 being the first for commercial licenses. Health Canada is in the process of compiling a complete list of commercial and research licenses issued in 1998. A report of licenses issued to the end of June 1998 is

provided in [Appendix A](#) (see Exhibit 1). This information is found, along with license applications, at their website ([HTTP://www.hc-sc.gc.ca/hpb-dgps/therapeut/htmleng/hemp.htm](http://www.hc-sc.gc.ca/hpb-dgps/therapeut/htmleng/hemp.htm)). Our own research shows at least 5,300 acres have been planted under the research and commercial license issued this year (see [Table 1](#)).

About a half dozen companies or consortiums account for the bulk of this production. As such, hemp production is concentrated in specific areas across Canada but is still composed mainly of small acreages. Maritime producers account for about 150 acres of the total while a half dozen other groups together planted over 80% of the total land area in Canada this year. Profiles of the key growers and processors in the Maritimes and the rest of Canada are found in [Appendix B](#).

Prov.	Known Research and Commercial Licenses	Acres (1)	Apparent Mkt
BC	Granby Hemp Co-op (Grand Forks) Transglobal Hemp Products Corp.(Vancouver Island) WestHemp Cooperative BC (Lower Mainland) Canadian Hemp Corp. (Contracts: BC, AB, SK) Jack Dobb (Dawson Creek)	27 ac. approx. 35 ac. approx. 20 ac. Unknown <1 ac. (research)	Grain, Fibre Unknown Unknown Grain, Fibre Grain
AB	8-12 commercial growers Chinook Applied Research Station (SE AB) 1 research license near Edmonton	150 ac. 20+ ac. Unknown (research)	Primarily Grain (oil) Unknown Unknown
SK	Western Growers Seed Corporation (mostly organic) GenEx (several organic growers, Regina)	approx. 250+ ac. 40 ac.	Grain, Seed Seed
MB	Canterra Seeds Ltd. (Winnipeg, 15-20 growers) Consolidated Growers & Processors (Winnipeg) Prairie Hemp (40 growers, contracted to Hempola) HempOil Canada Ltd. (St. Agathe)	approx. 200 ac. pprox. 800+ ac. approx. 500+ ac. approx. 40 ac.	Seed Grain, Fibre Grain Unknown
ON	Kenex Ltd. (Pain Court, 54 growers contracted) Hempline Inc. (London, about 20 growers contracted) Natural Hemphasis/Six Nations Reserve (Grand R.) Approximately 30 others (various locations)	approx. 2,000+ ac. approx. 500 ac 10 ac. (research) approx. 300-500 ac.	Fibre, Grain, Seed Fibre, Grain Grain, Fibre Unknown
PQ	Chanvre Esprit (Michael Gaudreau, organic prod'n) Orverd (Sylvain Donvierre, Lac St. Jean) Jerzy Prytyk, Ayers Cliff (assoc. w/GenEx in Regina)	20 ac. 25 ac. 20 ac.	Oil, Grain, Fibre, Seed Seed Fibre Grain (Oil & Food)
NB	Dr. Chuck Schom (St. Andrews, plots widespread) NB Department of Agriculture (Fredericton) Canadian Hemp Company Ltd. (Fredericton) Al Geddrey (Cambridge Narrows)	10 ac. (research) <1 ac. (research) 84 ac. (64 contracted) 10 ac.	Fibre Unknown Undetermined Fibre, Oil
NS	New Century Farms (Billtown, Kings Co.) Don Hunter (Pugwash area) NS Department of Agriculture & Marketing (Truro)	11 ac. 13 ac. <1 ac. (research)	Fibre Fibre initially Fibre, Grain

PE	Maurice Van Daele/Island Hemp Co. (Pt. Pleasant)	17 ac. (research)	Fibre, Grain
NF	No production	0 ac.	-
Total		approx. 5,300+ ac.	

Note: (1) All acreages are estimates based upon personal reports and news reports available on the Internet.

F. Trade F.1 World Exports

- According to Vantreese (1998)⁽¹⁾, since most Chinese fibre and tow production is used domestically, the European Union (EU) and Eastern Europe dominate the export market. Like production, exports are much less today than in the 1960s. Western Europe has increased fibre export in recent years through value-added re-exports from the Former Soviet Union and Eastern Europe.
- The EU, Turkey and Hungary are major world buyers.
- World export prices have grown in recent years (price increases have stayed ahead of inflation) but are sensitive to fluctuations in world production. Export prices vary across countries. For example, export prices in Germany were about US \$12/lb whereas Romania, Belgium-Luxembourg and the United States vary between US \$0.30 and \$0.40/lb (\$1996). The world average has been calculated to be US \$0.83/lb.

F.2 U.S. Imports & Exports

- According to Industry Canada, imports of raw hemp and tow and waste into the U.S. have been relatively small (about CDN \$150 thousand). Hungary, the Netherlands and China are major sources for these exports (see Exhibit 2 in [Appendix A](#)). It is interesting to note the data shows the US also re-exports raw or retted hemp to Belgium, Panamas, Canada and Haiti after some value-added activities have occurred.
- About CDN \$870 thousand of hemp yarn was imported into the US in 1997, mainly from China, Romania and Poland. Vantreese reports the US imported US \$2 million in woven fabric. Many woven hemp products imported into North America are actually a blend of hemp and other fibres such as flax, linen or cotton.
- Separate data for finished goods made of 100% hemp versus other natural fibres is not available. A 1996 hemp business survey by Jon Gettman suggests at least US \$23 million of finished goods are imported into the U.S.⁽²⁾

F.3 Canadian Imports and Exports

- Imports of raw hemp, tow, waste or true hemp yarn have increased from about \$22 thousand in 1993 to \$350 thousand (see Exhibit 3 in [Appendix A](#)).
- Chinese raw or retted hemp was imported into British Columbia in 1997. Hemp tow and waste is sourced from Spain, Hungary and Germany and shipped into Quebec, Ontario and Nova Scotia. True hemp yarn is shipped into British Columbia, Ontario and Quebec from Hungary, Poland and Romania.

G. Economics

G.1 Value of Hemp Products

There are many uses for hemp as shown in Figure 1, but finished hemp products can be costly. This is to be expected given the cost of importing, manufacturing and its status among health-wise and enviro-conscious consumers. The following hemp prices were gathered from published reports and interviews.

Fibre for Textiles:

- Hemp sliver (used to make high-quality textiles) is worth US \$17.50/lb on the Oxford Exchange.
- A Nova Scotia clothing manufacturer purchases bolts of Hungarian hemp through US wholesalers at a cost of \$24/yard (versus \$2-3/yard for cotton).
- Imported hemp canvas costs \$10/m FOB Hungary (based on 1,000 m).
- The Oxford Hemp Exchange Commodity Market posts the following prices ([HTTP://www.pbmo.net/oxhemp/commo.html](http://www.pbmo.net/oxhemp/commo.html)):
 - Fibre: US \$7.50/lb
 - Batting/Tow: US \$8.00/lb
 - Hurds: US \$7.50/lb
 - Sliver: US \$19.50/lb

Stalks/Fibre:

- Consolidated Growers and Processors of Winnipeg offers \$20/t for field retted and baled stalks on a dry weight basis (they provide harvesting, turning and baling services to farmers during the 1998 and 1999 seasons).
- Scutched fibre trades between Poland and Hungary for US \$900-1,000/t.
- Kenex Ltd. contract prices (*source: The Ontario Farmer, March 1998*)⁽³⁾
 - Fibre Contracts (Pre season expectation @ 3.5 ton/ac.): \$275/t
 - Fibre & Grain Contracts: (Pre season expectation @ 3.5 ton/ac.): \$200/t
 - Baled Hemp Delivered @ 15% Moisture: \$275/t

Grain:

- The Oxford Hemp Exchange Commodity Market sells bulk sterile seeds for US \$1.14/lb (\$50/bu on based 44 lb/bu).
- Kenex Ltd. offers 50¢/lb for clean grain @ 10% moisture.
- Consolidated Growers and Processors offers about 59¢/lb for cleaned grain.
- One Canadian oil retailer offers 50¢/lb for non-organic grain and 70¢/lb for organic grain.
- One Halifax store retails hempseed (grain) @ \$10.95 for 280 grams (they retail hemp pants @ \$85).

Certified Seed:

- Kenex Ltd. sells certified seed for \$3.30 to \$3.75/lb.

Other Contract Prices:

- One Maritime grower expects to offer contract growers \$275/t plus bonuses in 1999 if certain conditions are met.

Oil:

- A spokesperson from Hempola Inc. suggests Chinese oil can be purchased for about 75¢ to 85¢ per pound wholesale.
- German Oil is imported at a cost of US \$11-14/Litre (FOB for eastern seaboard).
- One Quebec grower suggest the Canadian retail value for 250 mg of oil ranges from \$17 to \$21 (this compares with \$7 to \$9 for oil combinations of borage and flax).

Body Care Products:

- Hemp hand protector purchased in England from The Body Shop sells for £6/100 ml (about CDN \$15). This is but one of five new hemp products that will be marketed in Canada by year end.
- Hemp moisturizing cream retails for \$12-13/100 ml.

G.2 Costs of Production

We have provided two examples of estimated production costs in [Appendix C](#) for Manitoba and Kentucky (which sourced Canadian growers for some of the cost estimates).

Recent cost estimates suggest hemp has the potential to be a profitable crop. Estimates from Manitoba suggest hemp grain can be grown for about \$245 to \$300 per acre depending on yields of 300 and 500 lbs/ac, respectively (see Table C.1 in [Appendix C](#)).⁽⁴⁾ This suggests the hemp grain must sell for at least 60¢ to 80¢/lb to break-even, depending on the yield.⁽⁵⁾

A recent University of Kentucky analysis estimated profits for fibre, grain, certified seed or fibre and grain could be in the order of US \$316, \$220, \$606 and \$319/ac respectively (see Table C.2 in [Appendix C](#)). These results suggest hemp producers would enjoy greater profits when compared with other US crops such as alfalfa, corn, barley or wheat (Table C.3).

Kenex Ltd. estimated net returns for fibre contract, fibre and grain contracts and cleaned grain (10% moisture) to be in the order of \$337, \$421 and \$550/ac, respectively.

The cost of producing hemp under various Canadian conditions and management regimes will not be known until independent and methodologically similar studies have been completed.

Interested growers must ensure their own estimates are accurately calculated and include all relevant costs.

Basic agronomic information is presented in [Appendix D](#) of this report. [Appendix E](#) provides an overview of hemp processing techniques.

H. Investment in the Canadian Hemp Industry: Actions to Date

Despite claims by some observers that many government departments have adopted a "wait and see" attitude to industry support, there is evidence to the contrary. The following are examples of hemp research and development in Canada:

- **British Columbia:** A total of \$20 thousand has been earmarked for the development of an association for hemp.
- **Alberta:** The Forest Products Business Unit of the Alberta Research Council (ARC), in conjunction with the University of Alberta Department of Renewable Resources is conducting a study examining the manufacture of panels, ranging from medium density fibre board to insulation board, from hemp. Trials include processing green hemp stalks to determine if there are quality differences between off-field and stored materials and examining resin compatibility and pressing techniques.
- **Alberta:** ARC is testing industrial uses such as panel boards made from both fibres and hurds. These activities are being funded through the Alberta Agricultural Research Institute (AARI) to a maximum of \$28 thousand under a Matching Grants Program.
- **Saskatchewan:** The Saskatchewan Neutraceutical Network in Saskatoon received about \$1 million from the Agri-Food Innovation Fund to organize an association, increase public awareness and investigate industry opportunities in neutraceuticals, including the use of hemp. They are currently involved in a survey of growers and processors involved in the industry.
- **Manitoba:** Both Prairie Hemp Ltd. and Consolidated Growers & Processors (CGP) have secured matching funds through Manitoba's new Agri-Food Research and Development Initiative to conduct agronomic research. CGP has received a \$60 thousand Agri-Food

Research and Development Initiative (ARDI) grant to investigate commercial production techniques that will enhance and accelerate the development of Manitoba's hemp industry. The project's goals are to increase seed supply, maximize yields and quality and make hemp products more cost competitive. Prairie Hemp Ltd. has been awarded about \$68 thousand for a commercial-scale evaluation of hemp to determine optimum production.

- **Ontario:** The University of Guelph Agricultural Research Station in Thunder Bay continues research in the agronomic potential for, and feasibility of, field production of low-THC hemp for seedgrain in Northern Ontario. This \$192 thousand project was made possible through funding from a number of sources including the Northern Ontario Heritage Fund, the local Federation of Agriculture, farmers and Kenex Ltd.
- **Kenex Ltd.** (\$60 thousand) and Hempline Inc. have received financial support from the Ontario Agricultural Adaptation Council's Can-Adapt Program. The support to Kenex Ltd. will help fund a non-woven fibre matting line to create products from fibre for use in textiles, autoparts, manufacturing and construction industries.
- **Quebec:** Jerzy Prytyck and a group of farmers received \$37 thousand under a Regional Development Agreement to assist in the costs of research, engineering, field days and preparation of a hemp production manual.
- **New Brunswick:** The Canadian Hemp Company, located in Fredericton has secured IRAP funding (Industrial Research Assistance Funding through the National Research Council of Canada) for a research and development project dealing with a variety of fibres.
- **Prince Edward Island:** Maurice Van Daele of Point Pleasant PEI is conducting a three year research project (\$44 thousand) with the PEI Food and Technology Centre and made possible by the PEI Department of Agriculture's ARIF Program (Agriculture Research Investment Fund) and a Federal Matching Investment Initiative.
- **Nova Scotia:** Mike Lewis has recently obtained several thousand dollars in provincial funding for a research and development project which will examine technical and marketing issues.

Clearly, there is government support for an industrial hemp industry in Canada. Hemp in North America is also supported by a diverse group of individuals and corporations. Supporters include farmers, non-agricultural businesses, scientists, unions (such as the Canadian Auto Workers), environmental advocates, financial institutions such as the Bank of Montreal⁽⁶⁾ and marijuana advocates.

I. Analysis of Market Potential

I.1 Introduction

The markets for hemp products can only be described as developing. This industry is in its infancy, having lain dormant on the supply-side for 60 years. Despite increased imports into Canada in recent years, volumes of imported raw fibre and manufactured goods are small. Little is known of the extent of markets available for Maritime, or for that matter, Canadian hemp produced.

The existing North American market for hemp is estimated to fall between US \$28 and \$30 million with annual increases of \$8 to \$10 million. The global market for hemp is valued at between \$100 and \$200 million annually.⁽⁷⁾

Many of the independent growers with whom we spoke are quickly approaching harvesting dates yet have not secured markets for their crop. In some cases, they are unsure of how they will harvest and process the crop and are frequently unsure of the price they will receive for what they harvest. Maritime growers are for the most part seeking out the same local markets. This is in sharp contrast to some of the key Canadian players who have made inroads in establishing not only markets but also new and in some cases innovative methods of processing hemp fibre and manufacturing final goods.

In general terms, the demand for hemp products is expected to ride the wave of the growing market for environmentally and economically sustainable products through:

- elevated consumer environmental awareness, and increased interest in purchasing natural fibre products grown with little or no pesticides; and,
- increased business environmental concern fueled by regulatory pressures such as the adoption of ISO 14000 (environmental management standards).

The following discussion presents our research findings and conclusions on major new and emerging hemp product markets. They include:

High-End Value-Added Opportunities:

- Oil and health food markets
- Textiles-woven and knitted such as draperies, carpets, apparel, etc.
- Textiles-molded or pressed

Medium to Low-End Value-Added Opportunities:

- Pulp and paper
- Building materials
- Alcoholic beverages
- Livestock feed
- Livestock bedding
- Biomass fuels

I.1.1 Oil

Background

- Most hemp oil originates from the U.S. where it is pressed from sterilized Asian, Indian or European hempseed.
- The market for certified organic hemp oil is growing. Sales of natural products in North America have increased by at least 20% annually for the last seven consecutive years.
- The oil market shows the most promise for Canadian hemp growers where crushing and pressing facilities have been, or can be, established. The future of the hemp industry in Western Canada is more suited as a dual-use crop where the grain can be marketed to crushers and the fibre utilized for other purposes.
- Canadian-grown hemp grain oil is expected to help the industry's marketing efforts by bringing price more in line with other natural products. For example, 250 mg of one brand of hemp oil ranges from \$17 to \$21, compared with \$7 to \$9 for oil combinations of borage and flax that can be combined to rival the same EFA levels.
- Recent reports from the U.S. suggest opportunities exist to capture a portion of the linseed oil market (used in high-value paints, sealant, inks and lubricating oils) and the flax meal market but only if it is price competitive.

Desirable Features of Hemp

- Hemp oil is considered superior to other oils in that it contains 1.7% omega-6 derivative gamma-linolenic acid (GLA), which many consumers find superior over other GLA sources such as primrose or borage oil.
- Shampoos and skin care products are considered promising areas for hemp grain oils. A strong marketing feature is their ability to penetrate three layers of skin.
- German cosmetics manufacturers consider hemp-derived shampoos and cosmetics competitive with other natural cosmetic products.
- It is not as imperative to locate grain oil processing facilities near production as is the case with fibre markets.

Barriers to Hemp Use

- Hemp oil is cold-pressed from seed because it is fairly unstable and may become rancid unless quickly preserved.
- While a market does exist, it can only be considered as developing. The total North American demand for hemp grain is said to be about 1,300 tons at current prices. This implies 2,600 acres of production producing 1,000 lb/ac, under current conditions. Other Canadian provinces have a long-standing history in large-scale oilseed production. No commercial facilities are said to exist in the Maritimes.
- The price of hempseed oil is expected to drop as supply increases and through price competition with other large-acreage oilseeds. One report suggests competition will drive down price by as much as 50%.
- Many respondents agreed cultivars will need to be tested and developed to maximize

production under our growing conditions. It is unclear to what extent 1998 research will show such compatibility given that Maritime growers have initially focused on fibre varieties.

What Does Industry Say?

- The oil market is a high value market worth pursuing if value-added processing facilities are established. A number of respondents and government officials made a strong case for organically grown hemp grain across Canada given that China is a traditional oilseed source but is not certified organic. Indeed, we spoke with a number of certified growers who were convinced of a burgeoning market.
- A spokesperson for Efamol Research Inc., a nutritional and drug development company in Kentville, suggests they are interested in learning more about hemp but are currently not involved in any research.

Maritime Potential

- There appears to be potential for oil production if both the agronomic and economic feasibility can be demonstrated. If viable, grain pressing facilities will need to be developed. One respondent we spoke with claims to have developed a short-season variety that will at least quadruple hemp grain production. Peter Dragla has developed two high-yield grain varieties for the oil market. Dr. Jace Callaway of the University of Kuopio in Finland has developed an early blooming variety called *Fin 314*.
- In fact, one presenter at a hemp symposium in held in Alberta during the spring of this years suggests there is no evidence that hemp can make significant additions to the agricultural sector in the province of Alberta.

I.1.2 Health Foods

Background

- Health food and nutraceuticals are considered a growth industry but this market is still in the early stages of development.
- Organically grown hemp is expected to fuel demand in this sector.
- In Saskatchewan there are more than 20 companies producing or processing nutraceutical or functional foods from a variety of plants. Their estimated total annual sales range between \$30 and \$40 million.

Desirable Features of Hemp

- Hemp grain is high in essential minerals, low in heavy metals and vitamins but contains a high proportion of protein and all eight essential amino acids. Soybeans contain more protein, but they are complex and many people find them hard to digest.

Barriers to Hemp Use

- It is unclear the extent to which this industry has developed but many respondents believe inadequate supplies have affected industry growth.

What Does Industry Say?

- Several health food stores we contacted do not carry hemp products at this time.

Maritime Potential

- Not unlike the oil market, there appears to be potential for various health foods given their high value if both the agronomic and economic benefits can be successfully demonstrated.

I.1.3 Textiles-Woven and Knitted

Background

- In Poland, a number of factories make hemp yarn and fabric. Other countries such as England, Germany, Romania and Austria continue to research processing technologies and value-added uses.
- Interface Research, a Georgian carpet manufacturer, has developed hemp carpets and is looking to Canada for most of its supply instead of China and Hungary. One article suggests the company will use 500,000 pounds of hemp fibre in its first year of production.

- **Hemp Textiles International in Washington was the first U.S. company to take raw hemp through spinning and into the textile stage, distributing its own brand of fibre called *Cantiva*™. Despite no current manufacturing capacity, the company plans to become active in Canada in the future.**
- **American Hemp Mills has recently spun imported hemp into textiles in the hopes of producing a higher quality cloth with a greater variety of colours than that which is currently found with imported fabrics.**
- **Several U.S. carpet manufacturers are using hemp as carpet backing in the hopes that processing technologies will be developed to provide a domestic source of carpet quality sliver. Hempline Inc. is setting up a fibre separation line in the hopes of meeting this demand.**

Desirable Features of Hemp

- **Hemp fibres have characteristics very much like flax fibres in terms of strength and can be processed into fabrics that can be mistaken for linen.**
- **Hemp is said to produce two to three times more fibre than cotton which will not grow in our climate.**
- **Hemp consumers will pay a premium price. One small Nova Scotian operation sells hemp clothing for two to three times the price of cotton apparel.**
- **Given the lack of equipment, the markets for needle-felted non-wovens (where less highly processed fibres can be used) can be considered in the short-term for the Prairie provinces. Hemp for textile applications is considered more suitable for Eastern Canadian agriculture relative to the Prairies given the optimal retting environment and closer proximity to manufacturing expertise.**

Barriers to Hemp Use

- **Continued price competition from synthetic and other natural fibres in the mass apparel and carpet manufacturing market has reduced the use of hemp fibre.**
- **Hemp apparel remains a cottage-scale industry because of limited supply and high costs.**
- **The textile industry is not known for its R&D and there will be reluctance to risk damaging current equipment. The technology for spinning hemp into fine yarns needs developing. Variable fibre quality wreaks havoc with high speed processing machines calibrated to accommodate fine fibres.**
- **There are few domestic processing facilities for fibre markets. It may take years for Canadian processors to produce fibre of the same quality and consistency as that produced by Chinese or European mills.**
- **A representative of the Canadian Textile Institute suggests hemp is hot at the moment but faces major obstacles. It is difficult to work with in long fibre machinery, has undesirable wear characteristics (wrinkling) and quotas on cotton fibre products have been relaxed.**
- **Geof Kime of Hempline Inc. suggests hemp canvas, rugs and upholstery may better compete on price with cotton or synthetic products because they more closely match the specifications of existing state-of-the-art canvas and rug weaving machinery than textile and apparel machinery. At the moment, machinery is not commercially available in North America to weave hemp fibre into textiles. It does, however, already exist in some countries such as China, Romania, Russia and the Ukraine. This is why woven materials are often imported from lower-income countries.**

What Does Industry Say?

- **A representative of Industry Canada suggests hemp will remain a niche market in textiles. The New Brunswick Department of Economic Development of Tourism is not aware of any textile operations in the Maritimes looking at using hemp.**
- **Neither Stanfields Ltd., Windsor Wear, Wear Well Garments, The Weavexx Corporation (produce paper-forming fabric) or Atlantic Yarns Inc. in Campbellton, New Brunswick are considering using hemp.**

- **Crossley Carpet Mills in Truro suggests that their plant and probably the entire industry will not shift away from using hard-wearing nylons and polypropylene/polyester for carpet backing. In fact, Dupont recently underwent a major expansion of their Kingston plant for polyester and nylons.**

Maritime Potential

- **While the textile and apparel markets are seen as major markets for hemp fibre by some growers and processors, there appears to be limited market potential for commercial scale manufacturing of textiles in Maritimes. Increased demand may change this situation as more sophisticated machinery is developed so that domestically produced textiles are competitive with imported materials.**

I.1.4 Textiles-Molded or Pressed

Background

- **Hemp can be used to make vehicle headliners, rear window shelving, door panels, matting under carpets, air bag parts and trunk liners. Kenex Ltd. has developed prototype molded automobile parts for headliners, trunk liners and rear window shelving. These products would use about 2.0 to 2.5 kilograms of hemp for each component. The US Department of Commerce reports that about 12 million new cars and light trucks are produced in the US each year, suggesting a significant market and estimated at 6,600 tons of hemp each year.**
- **Currently, European automotive manufacturers such as Mercedes Benz as well as one North American supplier are exploring the potential of bast fibers, including hemp.**

Desirable Features of Hemp

- **Molded or pressed parts from hemp are lighter, more fire resistant in crash situations and can be recycled to a greater extent. German researchers have developed a hemp and polypropylene composite which offers a lower cost than polypropylene alone for use in automobile interior paneling and headliners. There is also potential for its use in airplane and furniture parts.**

Barriers to Hemp Use

- **The market is only just developing, parts are at the prototype stage and no such technology is said to exist in the Maritimes.**
- **Price and proximity to automobile manufacturing plants. Kenex Ltd. has facilities in Chatham Ontario which are located within 100 km of major automobile plants in Southern Ontario and Michigan.**

What Does Industry Say?

- **There are no automobile manufacturing facilities in the Maritimes.**
- **Many assembly plants have moved towards an inventory system whereby suppliers are required to deliver components on an as needed basis. This makes it difficult for suppliers who are not located near assembly facilities.**

Maritime Potential

- **There appears to be little or no market potential for selling Maritime fibre to the automobile industry. There are no regional automobile manufacturers and Kenex Ltd. has advanced to the prototype stage for parts but is only just entering the market. Demand would likely have to outstrip their supply and their ability to secure outside fibre sources before Maritime fibre might be utilized. Even then, the parts would need to be manufactured nearby due to the high transportation costs of raw materials.**

I.1.5 Pulp and Paper

Background

- **There are reported to be over 20 paper mills in the world using hemp fibre for specialty paper production with an estimated production volume of about 120,000 tons annually, about 0.05% of the world pulp production.**
- **The average hemp pulp mill produces about 5,000 tons/yr. versus 250,000 t/yr. for wood fibre mills. Most are found in China and India and tend to use a mixture of fibres. Small hemp pulp mills in Europe also process other agricultural fibres. Kimberly Clark in France adds hemp and flax to wood pulp to make specialty papers for bank notes and cigarette**

wrappers.

- About one-half dozen North American mills produce hemp specialty papers. The Living Tree Paper Company of Oregon, markets a hemp paper milled in Canada for the fine printing and writing-paper market. Crane is now manufacturing special blends and recently announced a 50% hemp/50% cotton rag blend.

Desirable Features of Hemp

- There has been much talk of worldwide shortages in wood fibre and the potential for non-wood fibres. Inadequate reforestation of private woodlots is a concern in the Maritimes and some observers suggest shortages will occur early in the next century.
- New end-uses for pulp and paper are still being developed. A number of Canadian companies are investigating non-wood fibres as potential sources of cellulose.
- There is a growing demand for strengtheners for recycled paper markets.

Barriers to Hemp Use

- Manila hemp is the most important for papermaking worldwide.
- Growth areas are said to be in the volume markets of newsprint, writing and printing paper. These areas are at the moment well served.
- Hemp has never been used for high-volume paper markets because of high processing costs. Most experts agree that under current technologies, paper made with hemp can not compete with low-cost office papers. Many reports argue there is no known technical method of processing hemp fibre efficiently and economically to produce paper on a large scale.⁽⁸⁾
- A 1997 report by Atchison Consultants of Florida concluded the potential is limited with only the bast fibre being usable in a few high-priced specialties. Its economic use for any massed produced paper grades can not even be considered.
- A representative of Vancouver's Pulp and Paper Research Institute suggests many technical difficulties limit widespread use in most Canadian pulp and paper mills. These include:
 - Wood chips and pulp are available on demand whereas hemp would need to be stored by either the grower or the mill.
 - A number of second growth forests are coming on-line.
 - Chemical pulping processes reduce its volume by 50%.
 - Its high absorbency requires more water for washing and bleaching.
 - During heating to recapture the pulping chemicals, the silica turns to glass and must be handled whereas with wood-pulps, it burns away.
 - Hemp's high ash content, typical of non-woods, also causes scaling in the kiln.
 - Mills can purchase wood chips from sawmills and 60-70% of Canadian paper is made with these chips.
- Flax will be a major fibre used in specialty paper making in the Prairies. For example, two companies, Ecusta Fibres and Schweitzer-Mauduit Inc. in Western Canada will purchase about one-fifth of the oilseed flax planted in the area to make primarily cigarette wrapper paper.
- Current price for wood chips used as feedstock for pulp and paper manufacturing is about US \$35 per bone dry tonne. Hemp bast fibre would need to compete with this low price to be attractive.

What Does Industry Say?

- A number of industry contacts suggested hemp is being examined by some Canadian pulp and paper mills. Most of the mills we spoke with reported they are not considering using hemp given the nature of processes and the types of paper products they produce. These include:
 - Irving Pulp & Paper Ltd.: Interested in more information but they are not investigating its use. They manufacture newsprint.
 - Repap Enterprises Ltd.: They produce light-weight finished paper and so probably wouldn't use it as the pulping processes are well-established.
 - Stora Port Hawkesbury Ltd.: They use Kraft and thermo-mechanical pulping on wood fibres. They are not considering using hemp.
 - Bowater Mersey Paper Ltd. (newspaper): Technological problems and the

- need for chemical processes to get rid of the lignin will discourage its use.
- **Kimberly Clarke NS:** They use softwood species and are not looking into using hemp.
- **Minas Basin Pulp and Power Co. Ltd.:** According to press reports, is to date, the only Maritime company that has publicly expressed an interest in using hemp.⁽⁹⁾ One news report claims they are conducting lab tests with hemp and foresee replacing 10% of the 350 tonnes of recycled cardboard used daily. One estimate suggests a minimum of 3,000 acres would be needed to meet this demand. Full mill trials are apparently being considered later in the season once fibre is available.⁽¹⁰⁾

Maritime Potential

- Our research suggests there is limited market potential for all but one mill given current wood prices, available technology and little expressed interest from other mills. However, this one mill could fuel a significant increase in acreage but it would be limited to a small area in Nova Scotia. Transportation costs would preclude shipping raw fibre or hurds to mills outside the region. The economics of shipping pulp hemp fibre out of the Maritimes are unknown at this point.

I.1.6 Building Materials

Background

- There has been much experimentation with using hemp stalks to make composites. Researchers in France have been manufacturing blocks and insulation for a number of years. In Australia, 100% hemp masonite has been processed for a number of years without retting and processing.
- Erwin Lloyd, in his report, "A review of Building Materials from Bast Plants (1998)⁽¹¹⁾, suggests bast plants such as flax, kenaf and hemp can provide competitively low-cost materials suitable for particleboard and MDF (medium density fibre) applications as well as binding agents. The combination of physical, mechanical and chemical aspects of bast plants also lends their use to high-end structural composite applications. These opportunities, however, need to be investigated further.
- Potential products include a parallel strand board product, to be used as a laminate in structurally demanding applications. A second is a substitute to synthetic E-glass, similar to fiberglass, used in protruded products.
- Scientists in Alberta have been conducting research for several years now into making panels with hemp fibre.
- A number of factories using non-wood fibres have opened in Manitoba and Alberta. One in southern Manitoba will produce non-structural fiberboard (e.g. for kitchen cupboards or flooring). Four companies in Alberta are constructing strawboard plants using mainly wheat straw supplemented by barley and oat straw and flax shives. Hemp may be a potential feedstock in their production processes if the price is low enough.
- A strong, high-quality and lower priced plaster has been manufactured with hemp for use in building rehabilitation and construction in Germany.
- The Granby Hemp Co-operative will harvest 27 acres of *Zolotonosho 11* for grain and will supply the stalk to Canadian Particle Industries. There, the fibre will be used in various mixtures with wood fibre to test its applicability for door core and particle boards.

Desirable Features of Hemp

- European research suggests hemp fibre may result in a lower-weight and lower-cost material but higher value composite when mixed with other products.
- Research suggests hemp has particular qualities that make it a superior grade board.

Barriers to Hemp Use

- There are no Maritimes facilities for processing hemp feedstock into building materials.

What Does Industry Say?

- There is little or no infrastructure in place in the Maritimes to manufacture building materials with non-wood feedstock.

Maritime Potential

- There appears to be limited potential in the short term to manufacture hemp building materials in the Maritimes. Research is still on-going in Western Canada. Experience in Europe suggests it is feasible under their cost structures but it is unclear what are the technological needs and economic realities of its use.

I.1.7 Alcoholic Beverages

Background

- A small number of North American craft brewers have emerged with hemp beers. These include:
 - The Bowen Island Brewing Company Ltd. in British Columbia;
 - The Fredericks Brewing Company in Maryland that currently imports hemp grain through the Ohio Hempery Ltd. is looking to Canadian supplies for the future;
 - The Kentucky Hemp Beer Company that claims monthly sales of 7,000 cases, expected to rise to 10,000 cases later this year.
- No Maritime grain of any type is used in the production of beers in the region given the quality standards and location of malters, the nearest Canadian malter is found in Montreal.

Desirable Features of Hemp

- A review of limited marketing information suggests hemp is a specialty brew targeted to a very distinct market.

Barriers to Hemp Use

- We are unaware of any barriers to use other than proximity to brewers, the cost of the grain and the absence of malters in the region.

What Does Industry Say?

- Only one Maritime craft brewer is preparing for test batches of hemp beer over the coming year. The Garrison Brewery Company of Halifax indicated hemp will be used as a secondary additive to barley. Currently, they import malts from Montreal and England and pay \$19 to \$31 per 25 kilogram bag. They consider hemp beer's potential to be for the specialty market only. Current beer production is about 100 hectoliters each month.
- A representative of the Maritime Beer Company suggests the companies marketing hemp beer are very small scale, about 5% of their own annual production of 1.4 million dozen and are only responding to a fad that is not expected to last. They are not considering its use.
- A spokesperson for the Olands/Labatts/Keiths group indicated they are not considering producing hemp beers.

Maritime Potential

- There appears to be limited potential for supplying hemp grain to Maritime beer companies unless demand expands dramatically. There could be a potential niche market for a small number of growers but it is not possible to estimate the extent of this market potential at this time.

I.1.8 Livestock Feed

Background

- A recent report by the University of Kentucky suggests hemp grain contains sterogenic compounds that can promote cattle growth but this has yet to be scientifically proven.
- Much of the bird seed sold in the US has hemp grain as an ingredient.

Desirable Features of Hemp

- The hulls of hemp grains are reported to contain about 25% protein.
- Preliminary studies suggest horse and cow hemp grain feeds have been found to be competitive with other feeds.

- A number of reports make claims of improved livestock performance.

Barriers to Hemp Use

- Despite some recent interest in the Prairies, there has been no research on feeding hemp in Canada.
- Feed companies are highly competitive and are not expected to change formulas without extensive research. Even then, price will be the key determinant.
- Preliminary research suggests hemp grain feeds are not considered appropriate for poultry and swine.

What Does Industry Say?

- A representative of Flemming Feeds had little knowledge of hemp. While they are open-minded about new feed ingredients, they would require research documentation on the feeding energy values, livestock performance and costs. Beef rations, which require high-fibre content, might be a good testing ground.
- A nutritionist with Shur Gain mirrored this sentiment and added hemp would have to be price competitive with grains such as barley which is currently delivered at \$150-\$160 per tonne.
- Co-Op Atlantic is also interested in learning more about hemp but suggested if it were to be used as a feed filler, it must compete with soybean hulls, wild oats and screenings from Western Canadian elevators which are available at less than \$100 per tonne.

Maritime Potential

- There appears to be little potential to use hemp grain in livestock feeds without sound research documentation, local feeding trials and price competitiveness with alternative feed ingredients.

1.1.9 Livestock Bedding

Background

- A number of companies in France, the Netherlands and England are producing horse bedding from hemp hurds.
- One French growers Co-Op, known as "La Chanvriere de L'Abue", markets a product they call *Aubiose* and is primarily used for race horses in France, considered a very demanding and lucrative market. Furthermore, the more minute hurd particles are molded into cat litter and sold into France, Germany and England under various product names.
- This horse industry has been the primary market for hemp hurds in England. Owners of valuable thoroughbreds and breeding horses in England use nearly a quarter million tons of bedding each year. Hemp is reported to be competitive with high-value bedding materials such as woods chips or fine wheat straw. Hemcore in England sells hemp hurds for about US \$400 per ton. In the US, these two materials cost anywhere from US \$180 to \$240 per ton.
- The horse industry in the US is reported to be interested in developing bedding uses for hemp. States such as Kentucky have many stables. A recent report from the University of Kentucky estimates the potential demand for hemp bedding by the Kentucky horse industry would require 82,000 acres of hemp production.

Desirable Features of Hemp

- The key advantage of hemp is its absorbency and biodegradability. It is also reported to be easier to clean than some other bedding materials.
- The hurds can be produced as a by-product of other higher value markets and as such, can contribute to the economic viability of growing the crop.

Barriers to Hemp Use

- Higher value market opportunities and proximity to major livestock users.
- Only a small horse industry exists in the Maritimes, although Prince Edward Island's horse industry may benefit from its use. Cattle farmers have not traditionally used hemp for bedding. Sawdust remains a key bedding material for dairy farms because of its

availability and cost.

- Hemp straw is a very bulky commodity that loses both weight and volume as it is separated into fibre and hurds. Destined for different markets, this first stage of processing needs to be located at or near hemp growing areas.
- It is unclear whether processors would need specialty choppers for this market.

What Does Industry Say?

- According to one Maritime grower, the cattle industry may use hemp bedding but only if it can be delivered at a price competitive with current sources such as sawdust or higher priced alternatives such as straw.

Maritime Potential

- There may be some potential for Maritime hurds in the bedding industry if trials can be done to show its use and cost-effectiveness but market development and demonstration will be key to raising awareness of its merits and economics. While costs of production will not be known until processors produce it, it is unlikely the product can be economically trucked long distance to major markets.

1.1.10 Biomass Fuels

Background

- The hurd can be burned as is or processed into charcoal, methanol, methane or gasoline through a process called pyrolysis (destructive distillation).
- Hemp stalks can be used to create methanol or ethanol.

Desirable Features of Hemp

- High cellulose fibres in hemp make it an ideal biomass when exploring pyrolytic processes to create fuels. They are cleaner burning than fossil fuel products.
- There is research suggesting hemp produces much more fuel per acre than do cornstalks, kenaf or sugar cane.

Barriers to Hemp Use

- A Biomass expert with Natural Resources Canada (NRC) suggests an efficient process to convert hemp residues into ethanol is probably at least five years on the horizon. While Canadian demand for ethanol has historically outstripped domestic supply (satisfied through US imports of 15 million litres annually versus about 45 million litres annually total demand), a new plant in Chatham should satisfy the historical shortfall. The key would be cheap feedstock. Currently, about 50% of the cost of producing ethanol is feedstock. Hemp would have to compete with currently available starch sources. While there may be some potential for fibre produced near biomass fuel facilities, a fuel ethanol industry is not expected to develop based on hemp.

What Does Industry Say?

- It is unclear to what degree biomass fuel facilities and thus opportunities exist in the Maritimes. Pulp & paper mills use wood chips as their energy source, as does a small commercial heating plant in PEI. While this is not expected to change given supply and price levels, another representative with NRC suggested he would be interested in learning more about hemp and that there may be potential to set up a small demonstration project to explore biomass opportunities.

Maritime Potential

- Our research suggests little potential exists in the biomass fuel market for Maritime growers and processors as long as wood chips are available at low prices.

In summary then, the various markets for hemp products are developing and should generally be considered at an immature stage. The best example of a concrete opportunity for Maritime fibre (the focus of our growers) is expressed interest from Minas Pulp & Power. On a more general level, the oil, food and body care markets are said to growing and require less infrastructure investment than with fibre processing. Unfortunately, we must wait until at least 1999 before there are opportunities to rigorously test the suitability of available oilseed varieties to Maritime conditions.

We have prepared responses to a set of market potential questions that are based on the findings of this section. These are found in Table F.1 in [Appendix F](#). A glossary of hemp industry terms has been provided in [Appendix G](#). [Appendix H](#) lists the individuals contacted as part of the research for this study.

J. Overcoming the Obstacles to Growth

The results of the last section suggest a number of obstacles must be overcome before widespread development can occur in the Maritimes, or for that matter, the rest of Canada. These are described below.

J.1 Better Understanding of the Technological Hurdles

- Hand-cutting is a traditional method in low-wage countries but considered impractical for large-scale production. Mechanized harvesting can be done but it is very rough on machinery because hemp easily wraps itself around revolving parts. Development and testing of harvesting technology to Canadian conditions is still on-going with some prototypes only becoming recently available.⁽¹²⁾
- Processing technologies are generally regarded as antiquated and there is a need to adapt current technology from other fibre crops (such as flax) to commercial field production of hemp. Some industry experts opine economical processing infrastructure will be several years in the making.
- No processing facilities are available in the Maritimes even as we approach plant maturity.

J.2 Access to Seed and Appropriate Varieties Developed for Local Conditions

- There is limited certifiable (OECD), low-THC seed and fewer seed-bred cultivars are climatized for Canada.⁽¹³⁾ Seed multiplication may help curb this demand but varieties need to be developed for Canadian conditions. Many of the European cultivars are bred for fibre and not oilseed production. Environmental conditions necessary for seed production are said to be more favourable in areas outside of the Maritimes.
- Present members of the Canadian Seed Growers Association are expected to pursue this market. They have the experience, know the regulations and procedures and have the cleaning equipment required. While several hemp growers and processors are positioning themselves for the pedigreed seed market, it can take decades to develop new varieties.

J.3 Access to Information and Expertise

- While a number of well attended Canadian hemp symposiums and published government research have broadened the information base for this new crop, much proprietary management and technological expertise is being developed.⁽¹⁴⁾ Indeed, a number of projects are cloaked under non-disclosure agreements between government and private industry. This will impede growth of the Maritime industry to some degree.
- According to one contact, while partnering arrangements with other key Canadian players can assist in information transfer, the Maritimes needs to be at the forefront of research, development and testing if we are to successfully and economically penetrate the hemp market.

J.4 Biophysical Conditions

- It is unclear the extent to which biophysical variations in the Maritimes will tend to concentrate production and therefore processing facilities. Given the observed success of at least one grower, we know hemp can be grown, although yields will only become apparent following the harvest.
- A study by Sara Francis entitled, "*Hemp (Cannabis sativa L.) as an Alternative Fibre Source for Nova Scotia*" suggests Nova Scotia has soils deemed as only fair to poor for hemp growing (based on soil conditions and based on major limitations in slope and depth). This may also contribute to concentrated areas of production and processing.

J.5 Competition

- Hemp has a number of competing fibre alternatives for major fibre markets. For example, in 1997, farmers in Western Canada seeded 1.8 million acres of oilseed flax and over 200 thousand acres of edible oilseed flax (solin) with a total production of about 1.25 million tonnes of flax straw. Nearly a million tonnes of straw will be sold for \$6 to \$9 per tonne, burned or simply left in the field. Given the value-added potential and the need to reduce

environmentally unfriendly practices, there is pressure to find markets for the flax straw. Given the earlier arguments made for only niche market specialty papers, fibre markets will require considerable development before they can support large-scale commercial production.

- Maritime producers have only just entered a market in which several major players have some lead. Whereas some of the key players have focused on particular markets that do not overlap, Maritime growers are to some degree chasing the same markets in the region and will compete with larger players at the national level. Economics and market positioning will be vital to success.

J.6 Markets and Marketing

- Many independent growers are still in the process of developing markets for this year's crop. This suggests primary processors will likely play a key role in developing markets and that at present, the market is not structured for large scale and long-term growth.
- Contrary to many reports, hemp is at present a niche market. Increasing demand for hemp products over the last decade has not yet fueled an increase in world production of fibre and grain. Furthermore, there are limited markets for this year's production, although some key players are said to have markets secured. Expanding the range of value-added industrial products available and fostering the necessary consumer demand will take time.
- Careful product positioning and advertising for consumer awareness will be important to success in the higher-value oil and food markets. To quote one respondent, "the sizzle sells the steaks". Growers must understand that while infrastructure investment tends to be less than that required for fibre markets, considerable working capital is needed to launch a new product into the health market.
- One respondent suggested there is a danger in trying to pursue hemp in too large a scale for the Maritimes. Local uses and niche markets should be the focus initially suggesting a "get there first" situation versus unlimited demand.

J.7 Vertical Integration

- This is considered by many to be blueprint for success in hemp. The fibre market, the primary focus of Maritime growers, is not one where one individual farmer is likely to develop given the volume that is needed to economically sustain processing facilities. For example, HempFlax in the Netherlands complements its large growing base (over 5,500 acres) with two decorticating plants and a recently purchased a paper mill with an annual capacity of 30 thousand tons of paper (25% hemp composition). The company has spent millions developing harvesting and processing machinery.
- Primary processors should consider contracting hemp production to guarantee price and consistency of supply.

J.8 Partnering

- There appears to be opportunities for partnering both within and outside the Maritimes. We are aware Maritime growers have been networking with each other and with major players, to varying degrees of success. Given the level of partnering that is already occurring within the industry, Maritime growers and processors will need to develop a critical mass for production, marketing and distribution channels and partnering may be the key to quickly gaining a leg-hold in the industry.
- Partnering with other key players in the industry will also help to transfer expertise between growers, processors, manufacturers and retailers.

J.9 Price Uncertainty

- There is much price uncertainty in thin markets where the volume of trading is low. The degree to which production can increase without affecting prices is not known. Growers and processors need to do their homework on the economics and market potential of hemp. As production comes on line, prices will fall unless growing demand for hemp products outstrips supply.
- It is important to keep in mind that as subsidies in Europe are further reduced and phased out, the true economics of hemp will appear. If they are poor, world production may decline and this could act as a boon for Canadian producers.

J.10 Quality

- **Quality is a key determinant for market success, especially for use in textiles. While quality from some countries can be highly variable, low and medium wage countries tend to produce some of the best quality hemp products such as fabrics. Maritime growers must be keenly aware of market specifications and ensure standards are maintained.**

J.11 Quantity

- **Given the need for economies of scale, growers and processors will need to ensure they provide a consistent and adequate supply of raw and processed hemp if the industry is to attain the necessary critical mass. Key players in the industry have accomplished this through contracting and guaranteed pricing mechanisms.**

J.12 Regulatory Environment

- **The 1998 hemp licensing process was frustrating for many growers and processors. Many were given the go-ahead late in the season but seeded anyway. It is unclear how licensing may change or the extent to which hurdles encountered during the 1998 season may pave the way for next year's licensing procedures. It is imperative interested growers do their homework to ensure a smooth licensing process.**

J.13 Testing Facilities

- **THC-testing is a mandatory requirement for licensing. A number of testing laboratories are found across Canada but none have been established in the Maritimes. This should be addressed if the industry experiences rapid growth. We understand the Nova Scotia Agriculture College is examining the potential for becoming a licensed testing facility. The PEI Food and Technology Centre may also be a potential candidate.**

K. Conclusions and Recommendations for Industry Direction

K.1 Conclusions

We have been unable to confirm these reports with the company.

10.

It is important to note corrugated cardboard does not require the same level of processing as that of higher grade papers produced by many of the other Maritime mills.

11.

As found on the website for the Washington Hemp Education Network (WHEN) located at [HTTP://www.olywa.net/when/secto1.html](http://www.olywa.net/when/secto1.html).

12.

Tilby Systems Ltd., of Victoria, BC has a long history in sugarcane, kanaf and sweet sorghum fibre separation techniques. They are awaiting green hemp stalk to test the viability of using existing equipment to determine what modifications, if any, are needed for hemp. Another piece of machinery, *The Tornado*, marketed by Bolton-Emerson Americas Inc. of Massachusetts, has been developed to process non-wood fibres into papermaking material. While there are conflicting reports as to its effectiveness, the non-plugging machine is said to accommodate plants directly from the field and processes them into a homogenized fibre slurry by subjecting the fibre to repeated scissors-lime action thereby cutting the fibres into shorter lengths. Another piece of machinery, the *Chaflin*, then refines the pumpable slurry into papermaking stock. This has potential to eliminate the need to cook the slurry. For more information, visit their website at [HTTP://www.papermaking.com/tpmc/addeck/bolteme.htm](http://www.papermaking.com/tpmc/addeck/bolteme.htm).

13.

There are 26 approved cultivars in Canada for 1998. Kenex Ltd. has reported there is seed left over from this season as orders were reduced due to delays in licensing. Furthermore, seed prices are expected to fall by 10-15% in 1999.

14.

For example, the following statement can be found on the Kenex Ltd. website: We have compiled a great deal of knowledge, expertise and technology at a very high cost over

the last several years. Much of the information has been provided to the public at no charge but we hope you understand we must maintain some proprietary information in order to create a sustainable business.

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